

# Project presentation

Saarland University  
Software Engineering Core Course  
October 2013

# 1: Augmented Food

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Organization: Saarland University

Contact: Stefan Nürnberger


Technologies: Smartphone with camera

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The food in the Mensa is not always the best. We propose a smartphone app that uses augmented reality to project nice and delicious pictures over the plate in front of you. With this App you can enjoy food at the Mensa again. Simply look through your screen while eating and see delicious food while moving the fork towards your mouth.

Additionally, the App should support an extreme vibration mode used to numb your tongue by simply licking your phone for about 60 seconds.

# AUGMENTED FOOD

- Recent research has shown that the quality and taste of food in the canteen is 

Mensa →

- Unfortunately, the state of Saarland is very poor
- Hence, we try to find a solution in software that is programmed by students

# AUGMENTED FOOD



# AUGMENTED FOOD





# AUGMENTED FOOD

- ✓ Android App
- ✓ Detect geometry of the captured image
- ✓ Project perspectively correct images on top of the camera picture
- ✓ Should provide means to alter taste, e.g. by vibrating the tongue
- ✓ Other suggestions welcome



## 2: The Ultimate E-Coach

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Organization: MPI-SWS

Contact: Allen Clement

Technologies: Mobile device (iPad/iPhone/android)

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Ultimate Frisbee is a fast paced and exciting game where games last about 30 points, each point lasts about 2-3 minutes, and the players that play can be (and frequently are) changed between points. During a tournament weekend, a team will typically play 6-8 games and have 18-24 people on the roster.

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When managing playing time, a coach must strike a balance between winning the next point, winning the game, surviving the tournament, and making sure that all of the players have played enough to be happy with their place on the team. Over the years of coaching various teams in the US and recently the German National Team, I have developed a reasonably well-defined heuristic for balancing the above factors.

The project that I would like to see is an application for mobile devices that allows the user to track statistics for a team over the course of a game/tournament/season and also provides suggestions for who should play the next line that closely approximate the decision I would make if I were there myself.

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The key technical components of this project include:

- + a database for tracking team rosters, results, and points played statistics.

- + an analytical engine which calculates certain statistics over the course of many games/tournaments and is able to correlate and identify groups of players that play well (or poorly) together and identify statistical trends that impact the likelihood of winning a game.

- + an expert system that leverages the above to points in order to provide good suggestions for who should play the next point.

## Formula Student:

- International Design Competition for students
- Build your own race car
- Compete against teams from other universities at locations all over the world
- Dynamic events
- Static events:
  - Cost Report ☹️☹️☹️  
In detail report on costs of each part



Saar Racing Green Team

@ Formula Student!



## Project 1: Create Dataset

- Provide our engineers with a tool that helps to model the costs for each part of the car
  - Create a part
    - Add sub parts, material costs, processing costs, ...

## Project 2: Report Generation

- Generate documents from dataset
  - Create all required Excel sheets
  - Create complete Cost Report as PDF



The Projects:

Automatic Cost Report Generation

# 3: Racing Car "Cost Reporter": Create Dataset

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Organization: Saar Racing Greenteam

Contact: Johannes Mathieu

Technologies: basic SQL

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Every year Students of Saarland University build a new racecar for the international competition "Formula Student Electric". Such a car consists of a lot of parts with their own costs. Part of the competition is, to report all the costs of all the parts in the vehicle.

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The goal is to create an application, which simplifies the generation of this report. The application should support multiple users, multiple operating systems and it should log changes like a version control system.

The application should be able to import Excel sheets and export the whole report as PDF and Excel sheets.

**The application is split into two projects. This project goal is to import a given pricelist and to provide an user interface that helps the engineers to design the costs of the car in detail. All data has to be stored in a database, which will be read by the other project.**



# 4: Racing Car "Cost Reporter": Report Generation

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Organization: Saar Racing Greenteam

Contact: Johannes Mathieu

Technologies: basic SQL, LaTeX

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Every year Students of Saarland University build a new racecar for the international competition "Formula Student Electric". Such a car consists of a lot of parts with their own costs. Part of the competition is, to report all the costs of all the parts in the vehicle.

(continued on the next slide)

The goal is to create an application, which simplifies the generation of this report. The application should support multiple users, multiple operating systems and it should log changes like a version control system.

The application should be able to import Excel sheets and export the whole report as PDF and Excel sheets.

**The application is split into two projects. This project goal is to generate excel sheets using data read from the database provided by the other project. Those generated excel sheets have to be summarized into one big pdf file. And as a last step an pdf file has to be generated, that gives an overview over all parts.**

# 5: Calibration of Camera Networks

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Organization: MPI-INF, MMCI

Contact: Srinath Sridhar, Antti Oulasvirta

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We use multiple cameras (RGB and depth) setup around a person in a tabletop or a studio for markerless motion capture. These cameras, also called camera networks, need to be calibrated for position, colour and lens parameters. Currently, we use different tools strewn across 3 languages to do this. Some of the steps which are manual currently have the potential to be automated.

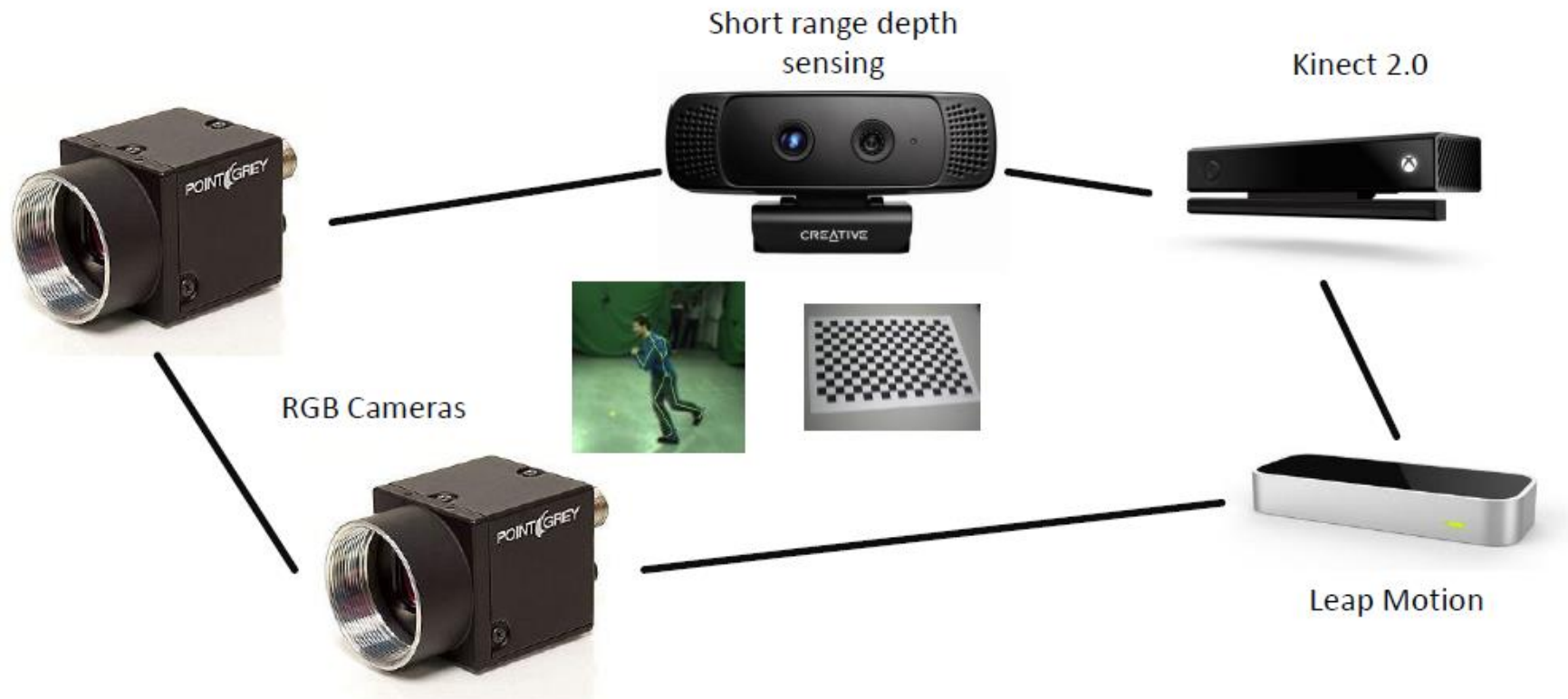
We are looking for a single unified software solution that do all of the above (and more if possible). The software should require minimal effort on the part of the user and produce output that can integrate well with the current workflow.

# 5: Calibration of Camera Networks

Organization: MPI-INF, MMCI, Contact: Srinath Sridhar, Antti Oulasvirta

## Problem

- RGB and depth cameras used for *markerless motion capture* of humans
- Cameras need *calibration* (for position, colour/depth and lens parameters)
- Currently, we use different tools strewn across 3 languages to do this



# 5: Calibration of Camera Networks

## Ideal Solution

- A **single unified** software solution that calibrates any kind of camera with **minimal user effort**
- Support **both** novice and advanced users (GUI vs. CLI)

## Opportunities

- Access to **state-of-the-art camera** hardware (Kinect 2.0, Leap Motion, high-end cameras, etc.)
- Learn basics of **geometry** in **computer vision**
- If successful, continue to support this as an **open source project** with a (much) larger audience

## Background

- Experience in C++, Python or Java
- Previous courses in linear algebra



# 6: Fingertip recorder

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Organization: MMCI

Contact: Antti Oulasvirta

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(description on the next slide)

## 6. Fingertip recorder

Kinect-based application to record 3D trajectory of fingertip during mid-air drawing



# Who we are and what we need?

- **We are Human-Computer Interaction group.**
- We study performance and ergonomics of full-body interaction.
- Recent advances in computer vision sensors (Microsoft Kinect, Leap) allow full-body input to be adopted for computer controls. But in many applications not optimal controls are used in terms of performance and ergonomics, which brings such applications to failure, for example current Kinect-based First Person Shooters.
- We are working on development of systematic method for assessment and analysis of full-body interaction, which will allow interface designers create better interfaces for future applications.
- **For our experiments and demonstrations we need software to record specific data from computer vision sensors. For our next experiment we need to record 3D trajectory of end-effector drawing the mid-air gesture.**

# Project requirements:

## **Core requirements:**

- perform calibration of system to the person
- identify human-centered coordinate system
- for each frame robustly identify 3D position of fingertip
- transform 3D position of fingertip to human-centered coordinates
- after completion of gesture, store gesture trajectory as sequence of 3D coordinates as well as human-centered coordinates
- performance of 30 frames per second on average PC, as given by kinect sensor
- store data about participant and gesture as meta-data to trajectory

## **Possible features:**

- guide user by showing next steps in GUI
- visualization of human-centered coordinate system with drawn gesture
- interface to pass recorded data to other applications, or to use developed software as plugin for other applications
- possibility to store data in binary files, \*.csv files, database, or HDF5 files
- cross-platform application
- store raw Kinect data (depth maps, skeleton, RGB data) together with gesture trajectory

# 7: Control App for the Visualization Center

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Organization: DFKI

Contact: Sebastian Wendland

Technologies: JS, HTML5, PHP, git, possibly Java

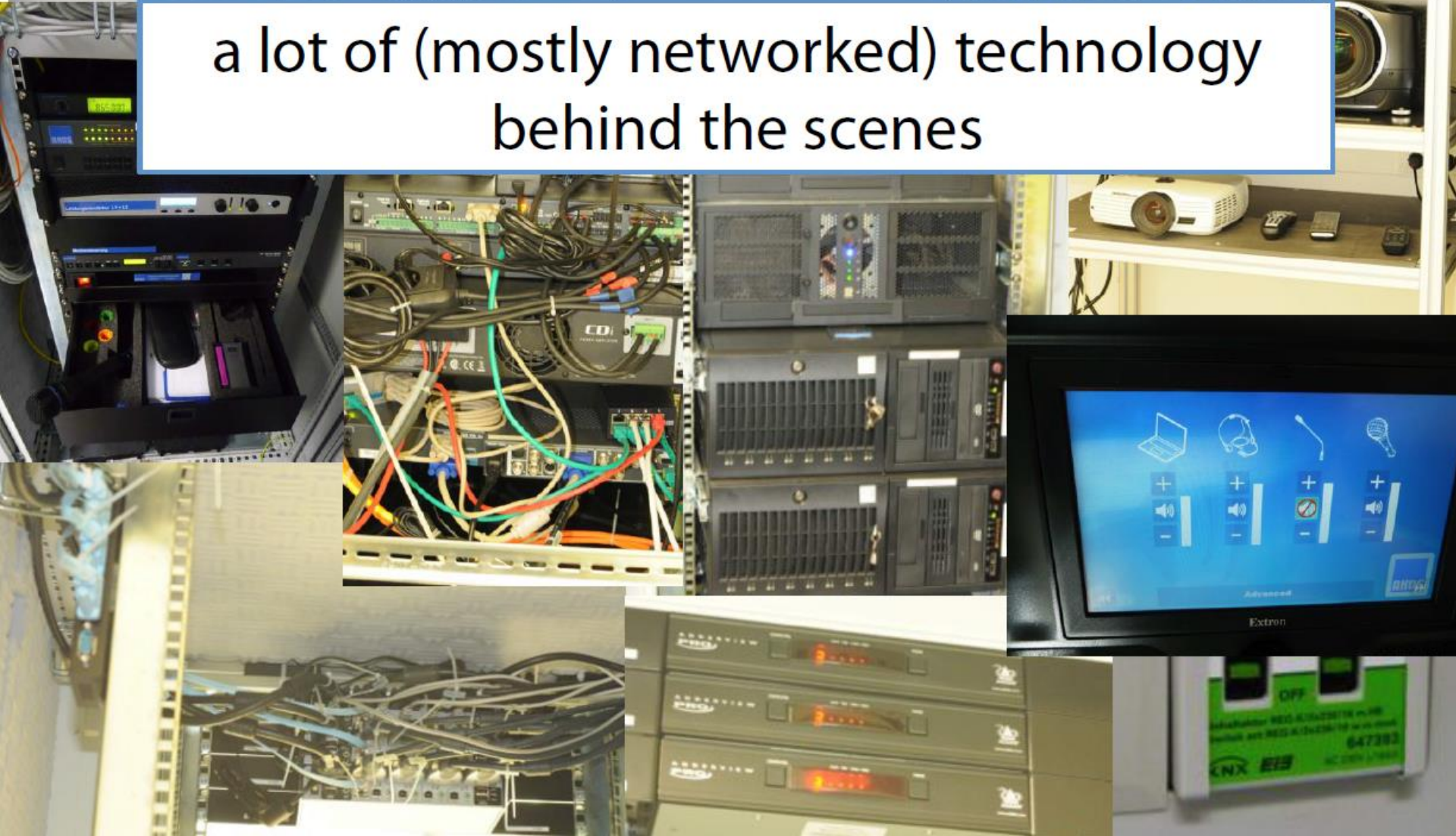
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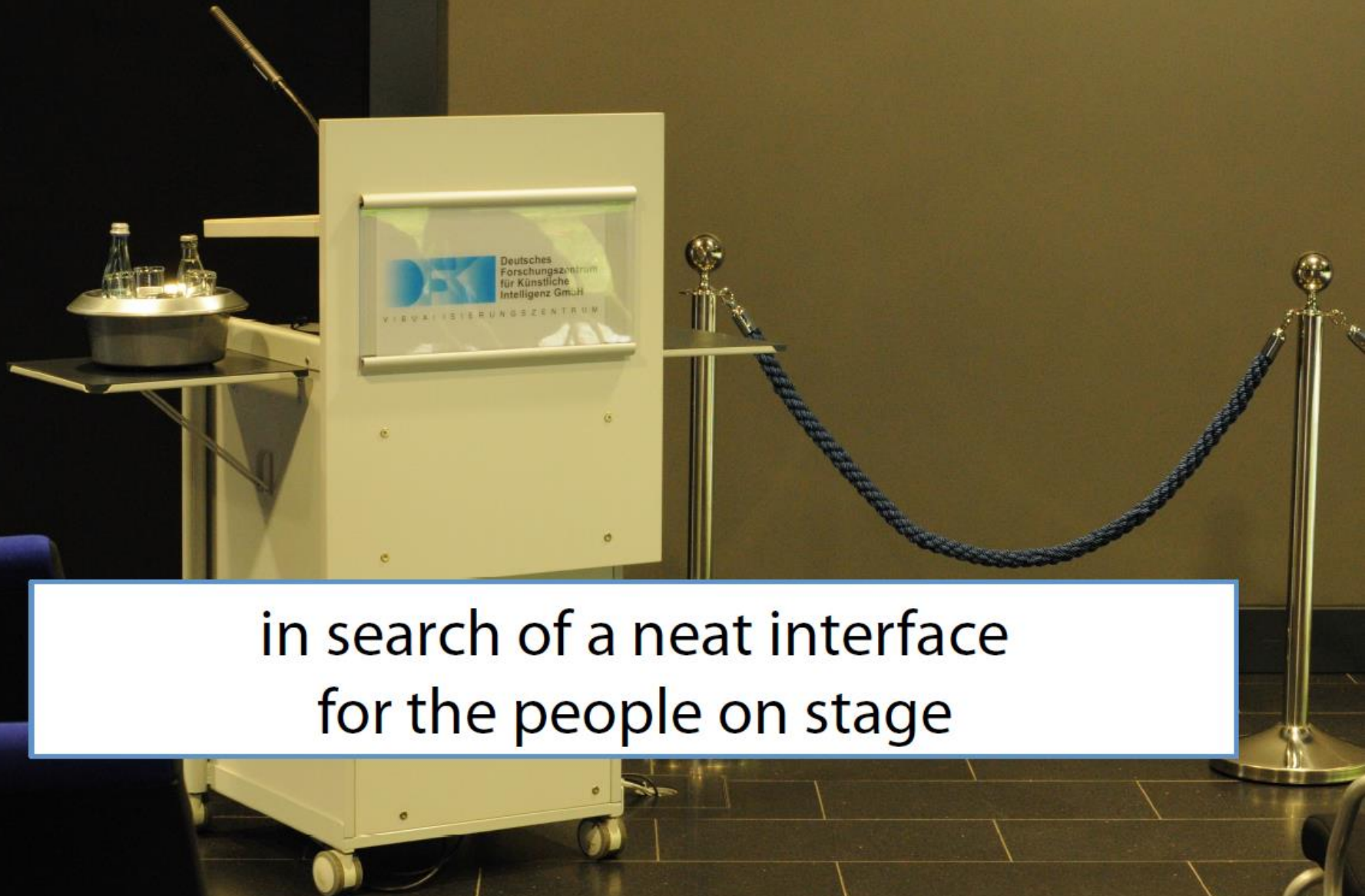
(description on the next slide)





a lot of (mostly networked) technology behind the scenes





in search of a neat interface  
for the people on stage

The Visualization Center at the DFKI has established itself as a popular locale for scientific presentations and public events. To support these events, the Viscenter employs a rapidly changing range of equipment, from COTS to technology prototypes, a fact that represents a problem: Even though pretty much every piece of equipment offers (or can be equipped with) a networked control interface, we do not have a method of controlling all installed equipment from one location or application. Obviously, this makes managing the Viscenter unnecessary complicated.

To solve this problem, we would like you to develop a unified control application consisting of two parts: A modular controller that can interface with the deployed equipment, and a touch UI for Windows 8 and/or Android (an App). To solve this task, you will gain access to the Viscenter and its equipment, as well as all code and specifications for existing interfaces. We will also provide all required development equipment.

# 8: Mobile 3D Video Player

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Organization: Intel Visual Computing Institute

Contact: Victor Matvienko

Technologies: Android, OpenGL ES

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(description on the next slide)



# Mobile 3D SCENE Player

- SCENE is a combined representation of computer graphics models (**meshes**) and real camera-captured 3D scenes (video + depth maps)
- A SCENE file can be rendered as a movie with awesome 3D visual effects
- YOU should develop a prototype Android player for SCENE (provided a desktop version)
- HiWi positions are available at the end of project





The goal of the project is to develop an Android application, capable of rendering a novel 3D scene representation, which embraces HD video, high resolution TOF depth maps, and traditional computer graphics models. Such scene representation allows to reach far beyond the features of the traditional video, allowing for example interactive viewpoint change or application of visual effects which are common to computer games but require a lot of manual work to be added to recorded video.

The captured 3D scene samples as well as a code base for processing and rendering them on a PC will be provided. The main efforts should be focused on implementing the mobile version of the scene player, with appropriate user interface and a support of a reasonable subset of features of the existing desktop version.

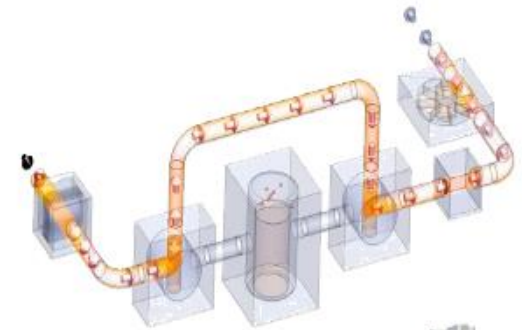
**3S GmbH**

*Project presentation Software Engineering 2013*



Projects:      Mobile data collection and visualization  
                    Data collection backend  
                    Reboot of 3S measurement software

- ◆ Innovative test and inspection engineering for quality control
  - Leak testing
  - Odor qualification
- ◆ Core competences:
  - Process engineering
  - Sensor engineering, metrology and signal processing
- ◆ Customer specific all-in-one solution: Sensor modules, lab devices, test machines
  - Supply of modules, (compact-) devices and machines
  - Customization services



We want to extend our use cases with mobile consumer applications. Our small sensor devices could, e.g., be used as a breathalyzer. Or one could check if their breath smells pleasant before an important date.

You would have to collect data from a bluetooth (serial) device, enter information about the measurement, send to a backend server for evaluation, visualize raw data and computed results.

Technologies: Android, Bluetooth, maybe WebDAV or a SQL dialect for data transmission, plotting/visualization lib of your choice

Odor classification measurements often run over extended periods of time, produce a fair bit of data (MB-GB) and can possibly be conducted anywhere in the world.

We need a way for our customers to send us their measurements and tell us how they were carried out as best as possible. We want to be able to find former measurements based on certain predicates like customer, date, type of measurement, sample number, description string or type of sensor used, to name a few.

→ Database system?



Once we have the data, we want the backend to trigger certain post processing jobs. In the case of raw sensor data for example we would extract certain features (maxima, slopes, etc.) and then apply a classification or machine learning method on them. Classification is done mostly in MATLAB (sometimes C or Labview) at the moment.

Technologies: linux based, some database,  
python/django appreciated, but not mandatory,  
Maybe MATLAB



Over the past couple of years, we have developed a tool that takes care of many aspects of a gas sensing measurement:

- configuration and starting of our measurement equipment: Mass flow controllers, environmental sensors, pumps, valves, and of course the gas sensors
- collecting data during measurements
- saving the configuration and raw data
- applying a pre-defined classification (i.e. smells good or bad)
- visualizing raw data or classification result

Our current tool is Labview-based and being engineers, not computer scientists, of course we made quite a few bad architectural and design choices along the way. The team that drafts the concept for the reboot shall learn from our mistakes.

Technologies: your choice of platform,  
Win/Mac/Linux-interoperability and python appreciated

Jens Peter

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[www.3s-ing.de](http://www.3s-ing.de)

***Gas sensing solutions...***

# 9: Mobile data collection and visualization

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Organization: 3S gas sensing solutions

Contact: Jens Peter

Technologies: Android, Bluetooth, maybe WebDAV or a SQL dialect for data transmission, plotting/visualization lib of your choice

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3S makes gas sensing technology. Currently we build fairly large appliances for industrial customers who want to know if their products smell ok or if their packaging has tiny leaks.

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We want to extend our use cases with mobile consumer applications. A user could e.g. use one of our small sensor devices as a breathalyzer. Or he could check if his breath smells nice before an important date.

Collect data from a bluetooth (serial) device, enter information about the measurement, send to a backend server for evaluation, visualize raw data and computed results.

# 10: Data collection and evaluation backend

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Organization: 3S gas sensing solutions

Contact: Jens Peter

Technologies: linux based, some database, python/django appreciated, but not mandatory, maybe MATLAB

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Odor classification measurements often run over extended periods of time, produce a fair bit of data (MB-GB) and can possibly be conducted anywhere in the world.

(continued on the next slide)



We need a way for our customers to send us their measurements and tell us how they were carried out as best as possible. We want to be able to find former measurements based on certain predicates like customer, date, type of measurement, sample number, description string or type of sensor used to name a few. We quickly found out that filesystem trees are not very good at this. Which database system do you think would be good for this task?

Once we have the data, we want the backend to trigger certain post processing jobs. In the case of raw sensor data for example we would extract certain features (maxima, slopes, etc.) and then apply a classification or machine learning method on them. Classification is done mostly in MATLAB (sometimes C or Labview) at the moment.

# 11: Reboot of the 3SG main measurement software tool

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Organization: 3S gas sensing solutions

Contact: Jens Peter

Technologies: your choice of platform, Win/Mac/Linux-  
interoperability and python appreciated

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(description on the next slide)

Over the past couple of years, we have developed a tool that takes care of many aspects of a gas sensing measurement:

- configuration and starting of our measurement equipment: Mass flow controllers, environmental sensors, pumps, valves, and of course the gas sensors
- collecting data during measurements
- saving the configuration and raw data
- applying a pre-defined classification (i.e. smells good or bad)
- visualizing raw data or classification result (good part - keep/bad part - throw out)

Our current tool is Labview-based and being engineers, not computer scientists, of course we made quite a few bad architecture and design choices along the way. The team that drafts the concept for the reboot shall learn from our mistakes.

# 12: Long-reach Bluetooth

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Organization: University of British Columbia

Contact: Ivan Beschastnikh

Technologies: android, java, c (maybe), networking, tcp/ip

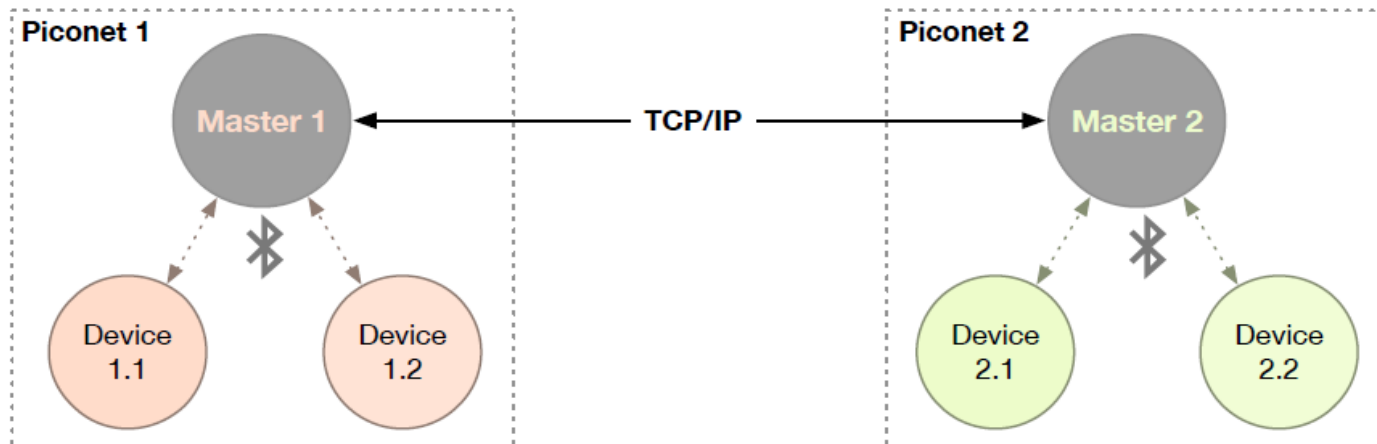
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(description on the next slide)



# Long-reach bluetooth

- **Scenario:** your office, down the hall from me, has a bluetooth printer that I want to print to from a tablet in my office.
- **Issue:** bluetooth range is limited to ~10m
- **Project goal:** allow two bluetooth “piconets” to talk to each other by tunneling bluetooth communication between the piconets over the local area network (e.g., over TCP/IP).



Bluetooth is a standard wire-replacement technology for connecting devices in close-range, within some 32 feet of each other. A large fraction of computing devices are bluetooth-enabled and is typical for an office to include a number of such devices --- a cell phone, a keyboard, a mouse, a printer, etc.

One issue with bluetooth is its limited range. However, a bluetooth network (a piconet) must have a master node and it is common for this node to have a connection to the internet. In this project, you will develop a prototype that deals with the range limitation of bluetooth by tunneling a bluetooth signal over the TCP/IP. More specifically, given two bluetooth piconets N1 and N2, you will make it possible for a device D1 located in piconet N1, to communicate with a device D2, located in piconet N2, through the master devices of N1 and N2, both of which are connected to each other via the internet (or the local network).

In many ways, the above is hinting that the solution will resemble a VPN -- a virtual private network, except that the networks are bluetooth piconets. The main challenge to this project is to understand the bluetooth protocol inside and out and to be able to hack mobile devices -- android devices are especially suitable to this project.



# 13: Visualizing commit comments with chromograms

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Organization: University of British Columbia

Contact: Ivan Beschastnikh

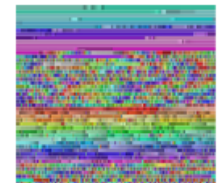
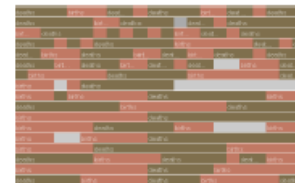
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(description on the next slide)

# Visualizing code repository histories with chromograms

- **Problem:** reading through revision histories is time consuming.
  - Inspecting textual commit logs and revision graphs is only feasible at small scales (e.g., 5 commits)
- **Project goal:** represent large revision histories in a useful, visual form.
  - Inspired by Chromograms, a tool to visualize article revisions in Wikipedia: <http://hint.fm/projects/chromogram/>
  - Maps words to colors and visualize text sequences as color maps
- **Desired deliverable:** a website that takes a repository and a range of commits as input, and outputs a chromogram map of commit comments and code changes.

- Example chromogram maps:



A chromogram is a colored box, whose color is based on the comment associated with the revision. As the chromograms paper cited below states --- "Simply put, Chromograms map text strings to color. The first three letters of a string determine the color of its representation. The first letter determines the hue; the second letter the saturation, and the third the brightness."

The deliverable in this project is a website that (1) takes a repository and a range of commits as inputs, and (2) outputs a chromograms map for the revision comments/changes for the range of input commits. Numerous extensions to this basic ideas are possible.

Here is one: include modified/created/deleted files as part of the chromogram color encoding or the spatial arrangement of the chromograms.

This project is inspired by Chromograms -- an effective means of visualizing revision comments in Wikipedia:

<http://hint.fm/projects/chromogram/>  
<http://hint.fm/papers/chromograms.pdf>

# 14: Experimental Environment Analysis Framework

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Organization: MPI-SWS

Contact: Anjo Vahldiek

Technologies: Java (preferred), JEE/PHP

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(description on the next slide)

# Analyzing Periodic Experiment Statistics

We build complex software **systems** & **study** them.

- **Periodically** rerun experiments (newer version/optimizations/...)
- Experiments of a single paper produce **~5000 statistics** in one run

**Your job:**

**Help us find **outliers** early and  
understand our systems even better.**

Provide a tool (e.g. web-based) allowing us to compare statistics from different runs (e.g. diff. code, optimizations).



Every research prototype we build for a paper is thoroughly evaluated by running tens of experiments (taking between 1-7 days to run). For a single paper this results in about 5000 statistical values that have to be checked for their validity. Optimizations to the prototype may help in one experiment, but cause overheads in a different experiment.

In order to be able to recognize these changes as quickly as possible, experiments are run periodically with the updated prototype. By this we ensure that all results depend on a common prototype. For every period all statistical values have to be compared to previous versions and across experiments for validity.

Currently this results in a lot of manual work. With this project we would like to automate analysis and graphical display of statistical values over several periods of experimental runs. Currently all experiments and statistical values are stored in a database. We suggest to implement a web front end to display variations in statistical values for experiments. In addition warnings could be raised, in case a statistical value experiences a dramatic change over time. (with (e.g. an optimization) or without (e.g. hardware failure) the code base changes)

# 15: Mobile Application "Discover and explore"

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Organization: UKS-Universitätsklinikum des Saarlandes

Contact: Oliver HERRMANN

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(description on the next slide)



Project  
Organization  
Contact

Mobile Application - „Inform and Guide – Discover and Explore“  
Saarland University Medical Center  
Oliver HERRMANN, Graphic Designer

## About us

The Saarland University Medical Center Units on its Campus more than 40 clinics as well as various institutes of the faculty of medicine of the UdS. We host more than 55.000 inpatients and more than 200.000 outpatients each year.

The various clinics are spread all over the Campus in around 100 buildings, which makes it a special task to guide patients and visitors directly to where they want or need to go.

Currently we are constructing a new central building, which will host the major clinics in one place.



Project  
Organization  
Contact

Mobile Application - „Inform and Guide – Discover and Explore“  
Saarland University Medical Center  
Oliver HERRMANN, Graphic Designer



### What we need

We'd like to have a mobile application (app or mobile web site) which allows us to inform and guide patients and visitors. This application should also serve us to showcase our competence in the fields of medicine and research.

We want our patients and visitors to explore and discover areas in an entertaining way.

### Inform and Guide functionalities (Basic)

- Navigation Features
- Search Function
- Information & Navigation for Emergencies
- Patient Tools
- Calendar

### Patients' Medical Examination Paths Feasibility study (Extra)

The newly constructed buildings are mostly equipped with WIFI standard 802.11n, allowing to detect the position of a user device right to the very room it is in. This would give us the option to guide patients or visitors not just to a particular building on the campus but also to particular locations within the building itself. We'd be interested to work on a feasibility study to see if this could be used for future services to **guide patients along a personalized examination paths** within the campus!

### Discover and Explore (Basic)

The map of the campus could display additional information about medical and research topics in close reach of the user's mobile device. Patients or visitors could use the application to discover and explore modern medicine simply by walking across the campus.

# 16: Dynamic Adaptive Streaming over Non-TCP

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Organization: Telecommunications Lab

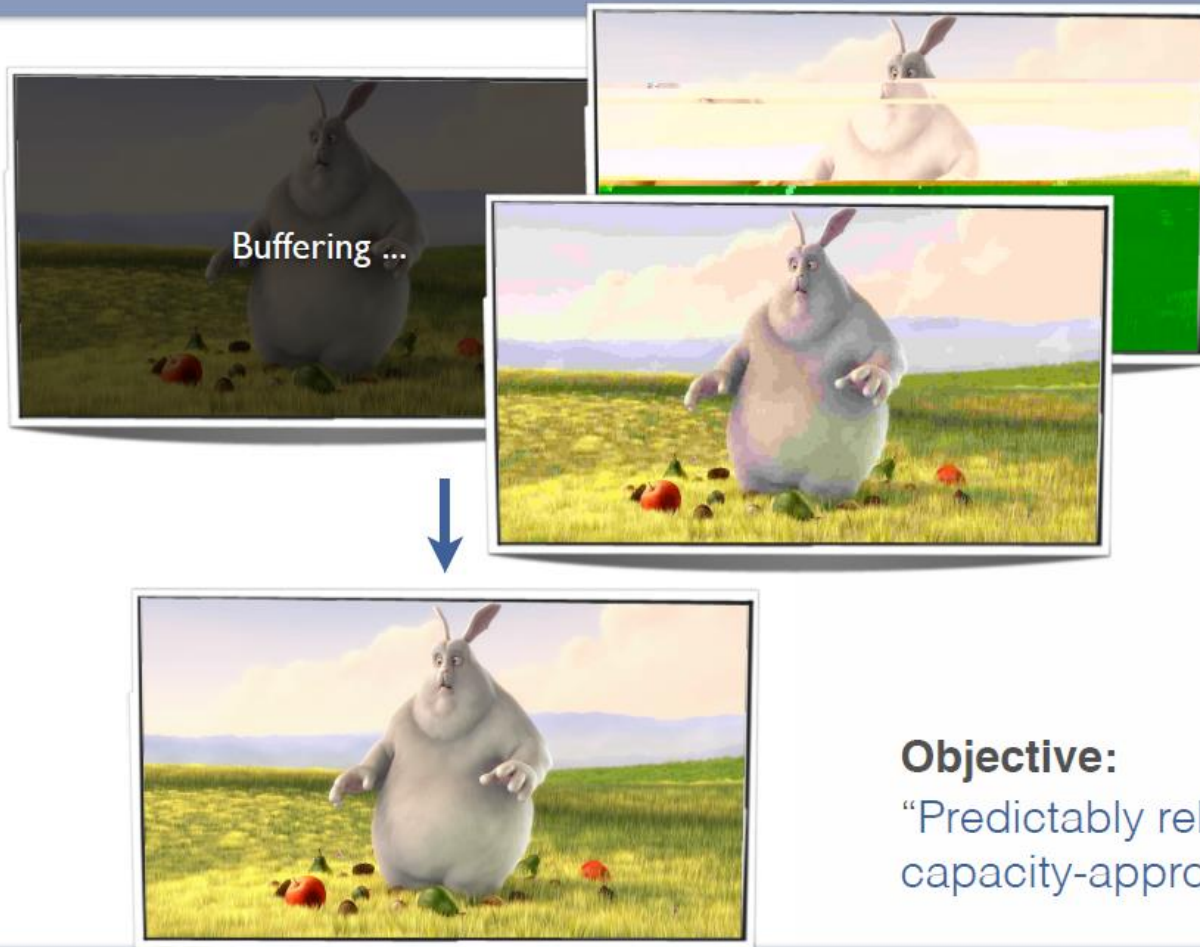
Contact: Manuel Gorius

Technologies: c++

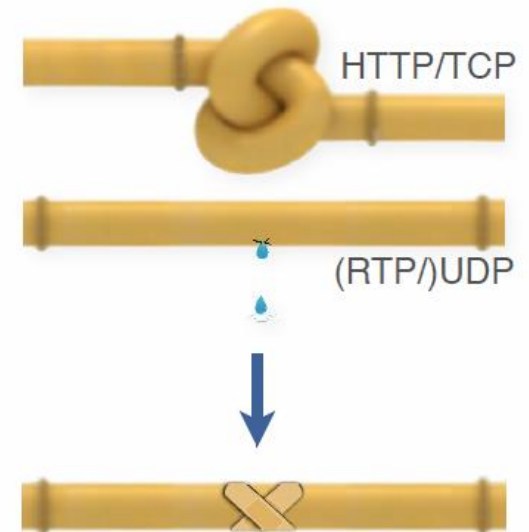
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(description on the next slide)





## State-of-the-art Internet video streaming ...



### Objective:

“Predictably reliable media transport pipe with capacity-approaching bandwidth utilization”





Dynamic video streaming over HTTP (Hypertext Transfer Protocol) is an emerging and recently standardized method for instant quality adaptation of Internet video streaming services under the currently available bandwidth of a network path. In a dynamic streaming application, video files are available at the web server in small chunks of different quality. The streaming client decides the quality level of the video by continuously requesting a chunk of the video file in a bit rate that matches the measured transport layer throughput.

In general, HTTP is implemented on top of the Transmission Control Protocol (TCP). However, TCP is widely known to be the major quality bottleneck of HTTP-based dynamic video streaming services. In particular on today's heterogeneously wired and wireless Internet paths, TCP's throughput suffers severely under the disadvantages of loss-based congestion control, ACK-clocked window progression and totally reliable error control. Low transport layer throughput in turn translates directly into low video quality of the streaming service. In order to address these limitations, the Telecommunications Lab has developed a novel transport protocol that delivers the right amount of reliability to continuous multimedia streams under their application-specific delay constraint. The protocol's basic design and behavior is quite similar to the User Datagram Protocol (UDP). In contrast to UDP it implements "multimedia-friendly" error control and congestion control.

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Recent standard drafts of HTTP pronounce the usage of alternative transport layers. The objective of this software project is the development of a small HTTP dynamic streaming application that builds upon non-TCP transport protocols such as UDP. The application comprises a server component that delivers the chunked video files upon client request. For simplicity, the client application stores the video file on the client's storage (decoding and rendering optional, see below).

Mandatory tasks of the project are:

- Implement bidirectional communication based on UDP sockets (some experience with the Unix Socket API is beneficial); a modular design that allows for convenient replacement of the transport protocol is desired.
- Compose and parse standard HTTP requests and responses.
- Parse XML-based manifest files as they are deployed in dynamic streaming over HTTP.
- Implement a simple flow control scheme (e. g. transmit a video chunk at its average video bit rate).

Optional tasks:

- Redirect the received video files to an open source media player (e. g. VLC or MPlayer)
- Integrate a more sophisticated flow & congestion control scheme (algorithms and code available at the Telecommunications Lab)
- Integrate the Predictably Reliable Real-time Transport protocol (PRRT) (developed at the Telecommunications Lab)

# 17: Printerface 2.0 (Backend)

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Organization: Software Engineering Chair

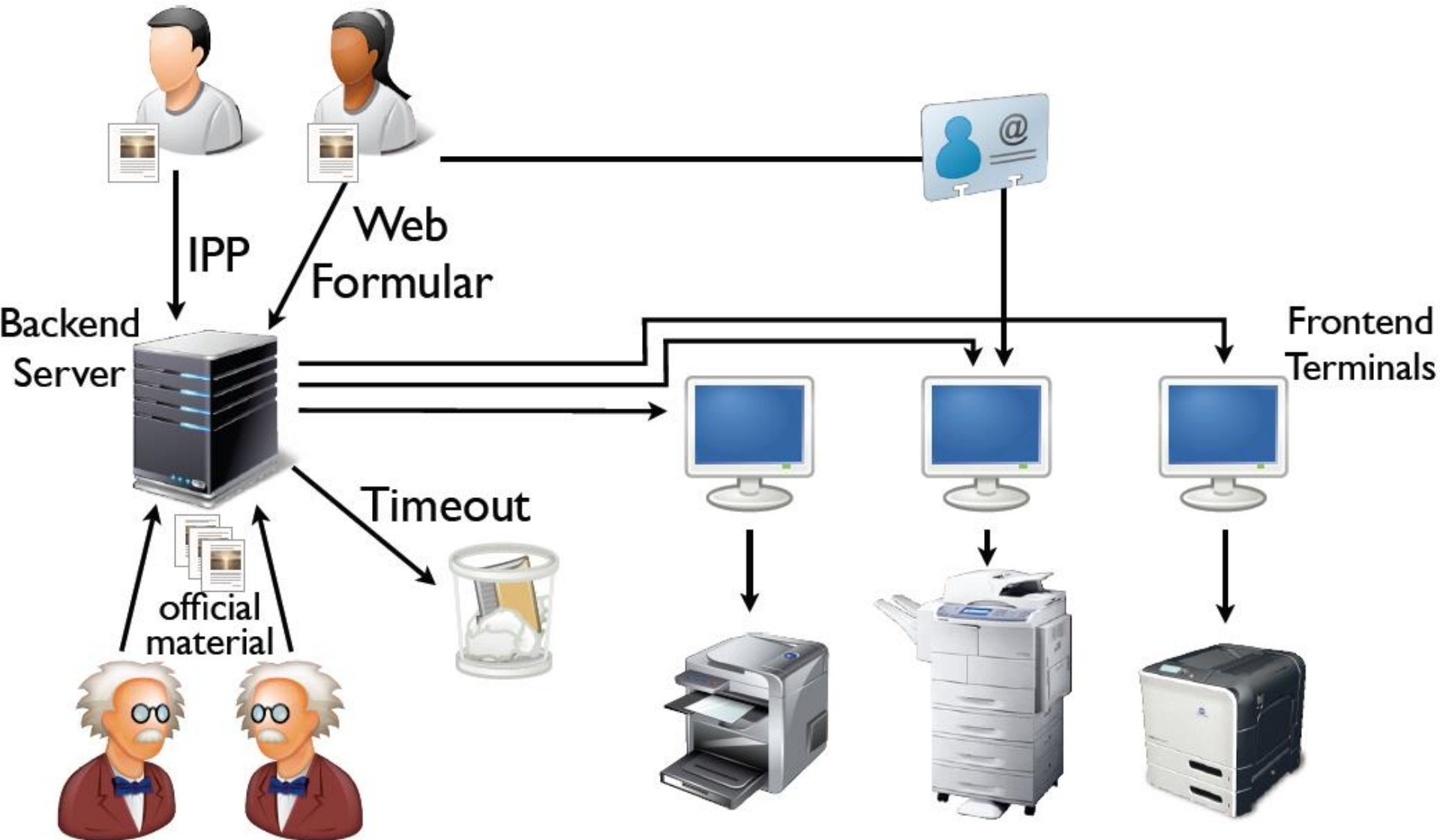
Contact: Clemens Hammacher

Technologies: html, xml, c++ (for cups), sql

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(description on the next slide)

# Printerface 2.0



Most of you probably already had contact with the current printer interface. It controls the students' printer in room 103. The current workflow is: Students send their print jobs to the cups server, a custom backend stores them in a database, the GUI shows it on the touchscreen, the student selects his job, puts the transponder card on the card reader ("blinkerface"), and the job gets printed. This workflow should essentially stay the same, but the whole system needs to be reimplemented and improved.

**In this project, you are concerned with the backend of the system, i.e. the central server which receives print jobs from students, and manages a database of official course material for printing. It distributes these documents to the frontend terminals, and manages the page quota per user.**

The work to be done includes a lot of requirements engineering, because also third parties (SULB, HIZ) are interested in adopting the printer interface. For those components which cannot be implemented within the given time frame, we will most likely be able to find sponsors to pay for the completion afterwards.

# 18: Printerface 2.0 (Frontend)

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Organization: Software Engineering Chair

Contact: Clemens Hammacher

Technologies: xml, c++ (for cups), swt or awt/swing

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(description on the next slide)

Most of you probably already had contact with the current printer interface. It controls the students' printer in room 103. The current workflow is: Students send their print jobs to the cups server, a custom backend stores them in a database, the GUI shows it on the touchscreen, the student selects his job, puts the transponder card on the card reader ("blinkerface"), and the job gets printed. This workflow should essentially stay the same, but the whole system needs to be reimplemented and improved.

**In this project, you are concerned with the frontends to the system. These are typically touchscreen interfaces which show the individual print jobs and provide access to a central course material database to be printed. Also, authentication of users needs to be handled. Additionally, the system should monitor the status of the attached printer(s).**

The work to be done includes a lot of requirements engineering, because also third parties (SULB, HIZ) are interested in adopting the printer interface. For those components which cannot be implemented within the given time frame, we will most likely be able to find sponsors to pay for the completion afterwards.



# 19: Automatic Task Sheet Generator

---

Organization: Telecommunications Lab

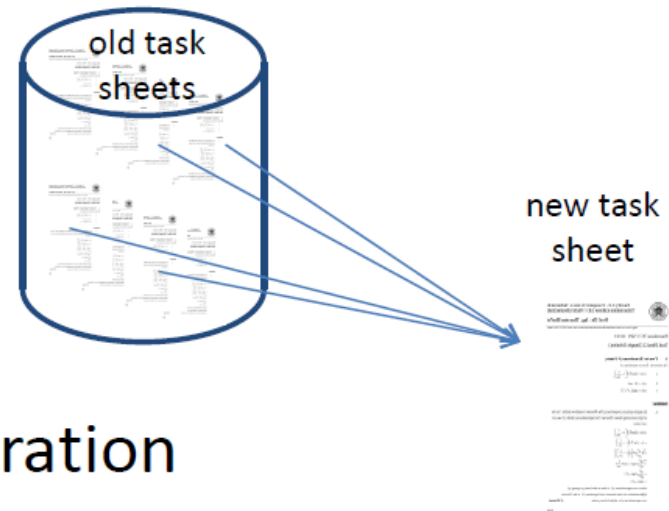
Contact: Christopher Haccius

---

(description on the next slide)

# Automatic Task Sheet Generator

- We have: Task Sheets from 10 lecture years, with problems for different topics
- We want: A tool that for a given set of topics and an approximate workload combines problems randomly for new task sheets



- Additional Features:
  - Problem modification
  - Student Feedback Incorporation
  - ...

Many lectures taught in Computer Science rely on weekly task sheets, which students have to answer as part of the examination process. For most lectures a repository of old tasks already exists.

We envision an automatic task sheet generator, that takes tasks from a task repository and combines them to new task sheets, under certain constraints, e.g. overall workload, content covered in the lecture, etc. Some tasks might be automatically modifiable, like modification of numbers in calculation tasks.

Student feedback could be incorporated (e.g. per task) to evaluate workload, difficulty, etc. of tasks.

Solution sheets should be automatically generated with the task sheets. Both, task sheets and solution sheets, should be provided in PDF format.

# 20: Verifiable Cloud Storage

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Organization: Cryptographic Algorithms Group

Contact: Mark Simkin

Technologies: Java

---

We would like a cloud storage (Client (Desktop + Mobile) + Server), that allows the verification (of correctness) of the stored data. In addition it should support streaming media content and verifying it's integrity on the fly. The description of cryptographic primitives, e.g. Signatures, VDS, will be provided by us. A seamless integration into popular existing cloud storage provider, e.g. Dropbox, would be desirable. A nice clean user interface should be provided, such that less knowledgeable users can handle the application with ease.

# Secure Cloud

Stream and Store in a Secure Manner



- Verifiable Cloud Storage
- Stream Content with on-the-fly Verification

# 21: Transmission and Visualization of Machine State Information

---

Organization: Intel Visual Computing Institute

Contact: Yongtao Shuai

Technologies: Those listed in description (optional) + HTML/JavaScript/CSS + Windows + Chrome browser.

---

(description on the next slide)

# Browser-based Remote Maintenance Tools

Device-independent Multi...

Video Controls: [Play] [Pause] [Stop] [Full Screen]

Video Streams: Static [Worker] [View]

Simulation: [Alarm Events]

Press k to see the keyboard shortcuts.

Created by Jochen Grün, gruend@intel-ws.uni-saarland.de.

Sync Views: [On] [Off]

Control Modes: [None] [Select] [Alarm]

View Modes: [None] [Select View] [Alarm]

Mail Box: Drop message to send

Video View: [Close]

Rendered View: [Close]

Participants: [Close]

- Jochen [Call User]
- Michael [Call User]

Video Conference: [Close]

- Jochen [Disconnect]
- Michael [Disconnect]

Sensor Value Charts

- M105\_F1(pump): pressure[bar]
- M105\_F2(pump): pressure[bar]
- M105\_F3(pump): pressure[bar]

Active Alarms

- Problem with pump M105\_F2  
[15:11:40] [15:11:40] [15:11:40] [15:11:40]  
pressure of pump M105\_F2 exceeds limits.
- Problem with pump M105\_F1  
[15:11:40] [15:11:40] [15:11:40] [15:11:40]  
pressure of pump M105\_F1 exceeds limits.

Chart time period (in min.): 1 [Connect]

**TODO**



# Machine State Information

## • Transmission

- **Low latency:** low extra delay than network delay
- **Reliable:** error free
- **Sync:** data are synchronized on all clients
- **Local storage:** data can be locally stored on client



## • Visualization

- **Creative:** intuitive, informative, correlative, friendly UI
- **Dynamic:** real-time, fast response
- **Interactive:** can be interacted with other clients and events
- **Numerical analysis:** e.g. interpolation, extrapolation, filtering



This project is a sub task of browser-based remote monitoring and remote maintenance & diagnostic tools in modular factory. Through their rich visualization capabilities (stereoscopic video & 3D graphics as well as real-time state information), they offer a way to aggregate and structure the wide-spread variety of information from different sources that is required to analyze such complex scenarios.

## **Goals**

### **Transport of sensor data from the Factory into a web interface**

To transport sensor data from the Factory, a web service must be implemented that can access a database and offer this information via http-get or another REST service API that is accessible via JavaScript. There are some frameworks that make this work, e.g. .Net WCF in combination with ADO.NET Entity Framework or some Java Webservice framework.

### **Visualization of sensor data from the Factory in a web interface**

The visualization of the sensor data is a more creative work. Visualizing the data is something that can be anything one thinks to be adequate.

# 22: Interactive SCRUM board

---

Organization: DFKI

Contact: Tim Dahmen

Technologies: Web Services, mobile integration, optional  
gesture recognition, SQL

---

(description on the next slide)

Agile development methods such as SCRUM are increasingly used in software development and gain wide spread acceptance in the industry. Central to the SCRUM method are certain artefacts, such as the SCRUM board (sprint backlog, product backlog) which contain information on requirements and the project status. The boards are typically implemented as whiteboards with paper based information markers. Software solutions exists. As those software approaches typically follow a desktop-metaphor to the GUI design, they integrate poorly with the intended highly cooperative situation of SCRUM meetings. In this project, a software solution to sprint backlog and product backlog is realized that can be used as much as possible as the paper version while providing the obvious advantages of a software solution, such as backup, email integration and automatic history generation.

# 23: PHAT - PHysarum Analysis Tool

---

Organization: MPI-Inf AG1

Contact: Adrian Neumann

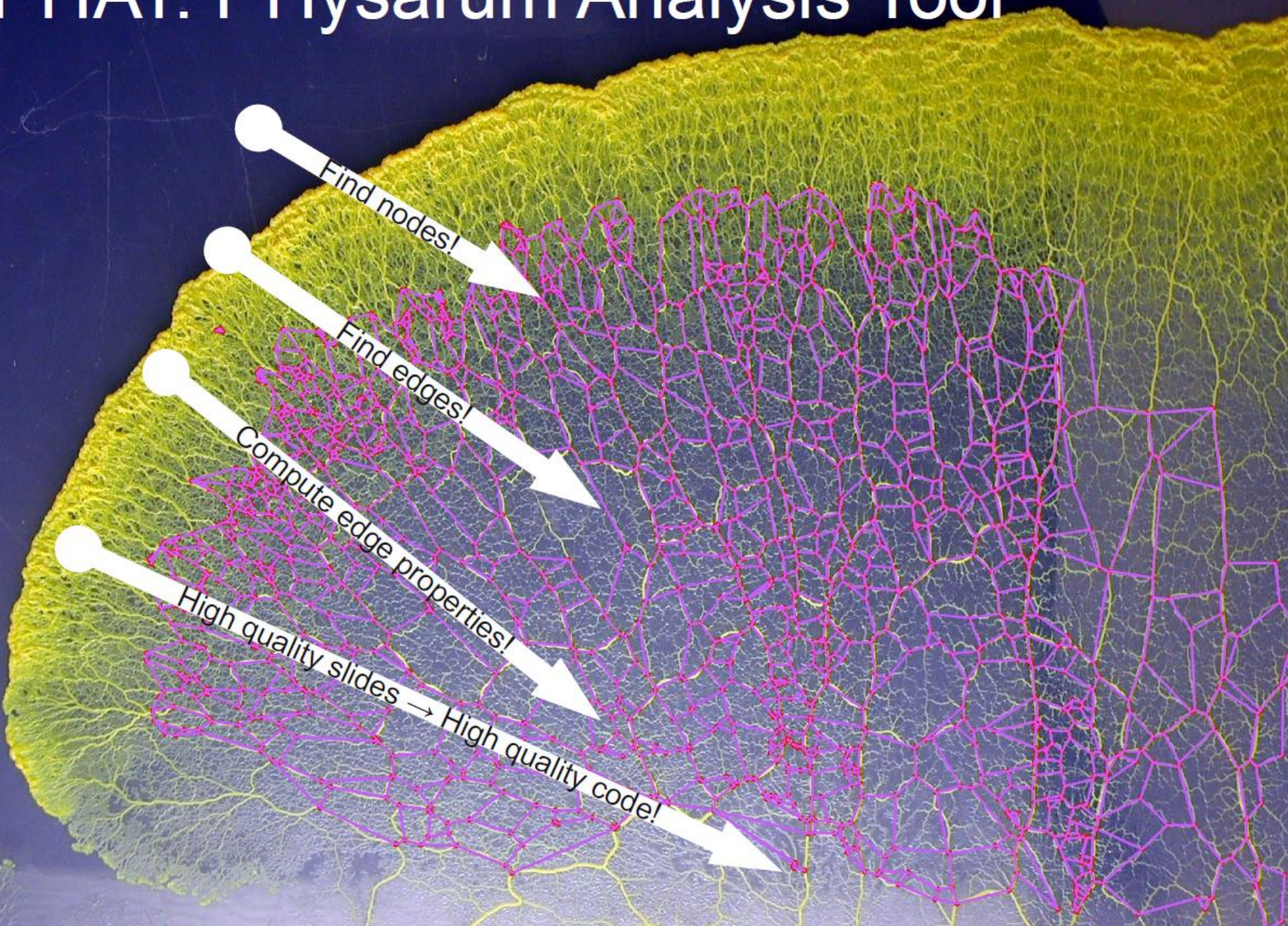
Technologies: Python, Cross-platform, git, openCV, networkX

---

(description on the next slide)



# PHAT: PHysarum Analysis Tool





As rebel part of Kurt Mehlhorn's research group we focus on understanding the workings of the slime mold *Physarum Polycephalum*, an amoeboid unicellular organism, which despite lacking any form of brain or nervous system, can solve complex problems in a distributed manner. Understanding this organism and extracting algorithms that mimic its behavior are amongst the goals our work.

To build up intuition for the way this organism works we conduct various wet-lab experiments with life *Physarum*. Amongst other things these experiments produce a large number of pictures of plasmodium networks that need to be scientifically analyzed.

We would like to have a piece of software that, given a picture of a plasmodium network, extracts the graph topology including edge lengths, edge diameter and various other quantities. Since the final output is intended to be used for scientific work we place particular emphasis on estimation of errors and error correction.



# 24: Web-based ProVerif Editing Environment

---

Organization: CISPA / Saarland University

Contact: Raphael Reischuk

Technologies: SAFE: HTML / SFW / PHP / JS; and ProVerif

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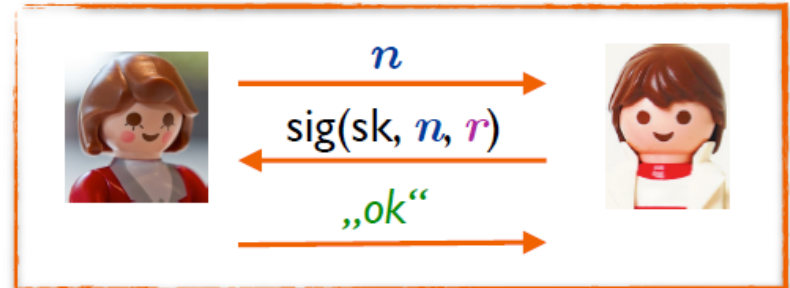
(description on the next slide)

# Web-based ProVerif Editing Environment

- S.1) getting acquainted with the **SAFE framework**
- S.2) **user management**: create / delete / manage users



- P.1) getting acquainted with **ProVerif**
- P.2) **project management**: manage ProVerif code projects
- P.3) **syntax highlighting** for ProVerif code
- P.4) **ProVerif queries**: interface to send queries and code to ProVerif and to interpret (receive and display) ProVerif's output



A collaborative web editor for the security protocol verifier ProVerif [1] shall be created. Users shall create new ProVerif projects of which the source code can be managed (e.g., it shall be displayed with appropriate syntax highlighting, shall be editable, etc). The code shall be sent to the ProVerif compiler. Compilation results shall be displayed in the browser with useful annotations close to the code. A similar tool (w/o syntax highlighting) is [2]. The tool shall be developed in the SAFE environment [3].

Milestones:

S1) getting acquainted with the SAFE activation framework [3]

S2) user management: ability to create / delete / manage users

P1) getting acquainted with ProVerif [1]

P2) project management: ability to create / delete / manage ProVerif projects

P3) syntax highlighting for ProVerif source code

P4) ProVerif queries: interface to send queries / code to ProVerif and to interpret (receive and display) ProVerif's output

[1] <http://prosecco.gforge.inria.fr/personal/bblanche/proverif/>

[2] <http://proverif.rocq.inria.fr>

[3] <http://www.safe-activation.org>

# 25: Web Interface for Checking ProVerif Process Conditions

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Organization: CISPA / Saarland University

Contact: Esfandiar Mohammadi

Technologies: SAFE: HTML / SFW / PHP / JS; and ProVerif

---

(description on the next slide)

# Web Interface for Checking ProVerif Process Conditions

- S.1) getting acquainted with the **SAFE framework**
- S.2) **user management**: create / delete / manage users

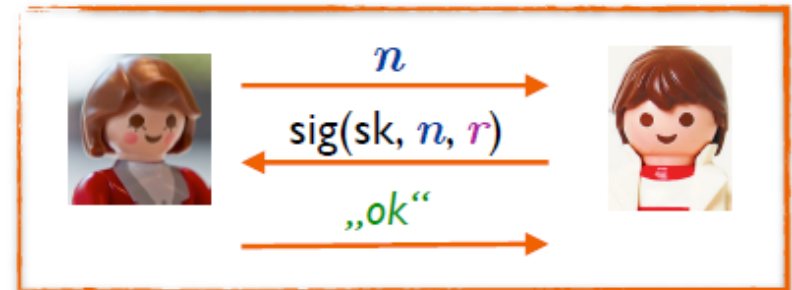


- C.1) getting acquainted with **ProVerif** and with **process conditions**

- C.2) **project management**: manage process conditions

- C.3) **parser for process conditions** against ProVerif code

- C.4) **queries**: interface to send queries and conditions to the parser and to interpret (receive and display) its output



In this project, we demand a checker for ProVerif process conditions [1]. A collaborative web editor for the security protocol language ProVerif [2] is assumed. A specification language for process conditions shall be developed. Later on, users shall specify process conditions in this language. A parser shall check the specified process conditions against a ProVerif protocol. The overall tool shall be web-based and shall be developed in the SAFE environment [3].

Milestones:

S1) getting acquainted with the SAFE activation framework [2]

S2) user management: ability to create / delete / manage users

C1) getting acquainted with ProVerif [2] and with process conditions [1]

C2) project management: ability to create / delete / manage process conditions

C3) parser for process conditions against ProVerif code

C4) queries: interface to send queries / conditions to the parser and to interpret (receive and display) its output

[1] <http://eprint.iacr.org/2009/080.pdf>

[2] <http://prosecco.gforge.inria.fr/personal/bblanche/proverif/>

[3] <http://www.safe-activation.org>

## 26: Supporting the CS research community: Integrating dblp into the authoring workflow

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Organization: Schloss Dagstuhl - Leibniz-Zentrum für Informatik

Contact: Marc Herbstritt

Technologies: LaTeX, XML, git/svn, PHP, pattern/string matching, HCI, ...

---

(description on the next slide)

**Abibitec[805042]**  
 Henriquez, Daniel Riecco, Carlos Salgado, Mario Beron, and Pedro-Rangel.  
 Herramienta de soporte para la creación de documentación de programas.  
*Workshop de Ingeniería de Software de la Universidad de Chile*, 2006.  
**Abibitec[805043]**  
 M.-Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805044]**  
 P. R. Henriques, M. Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805045]**  
 P. R. Henriques, M. Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.

# Supporting the CS community: Integrating dblp into the authoring workflow

- Consistency of bibliographic references in CS research papers: local author bibtexp data base vs. dblp
- Support CS authors and publishers by „synchronizing“ references
- dblp: most complete and consistent data base of CS research literature
- Consistent bibliography purifies citation analysis (the „holy grail“ of research assessment)

## Aims

- Provide reliable and robust service, e.g. researcher submits local .bbl file and gets „synchronized“ .bbl file
- Easy-to-use, low usage barriers

## Challenge

- Wide range of technologies: Text parsing, pattern matching, XML, web service, ...
- Customer specification

**Abibitec[805046]**  
 U. Weiskopf, M. J. V. Pereira, and D. Riecco. Utilizing web search engines for program analysis. *18th International Conference on Program Comprehension*, 2010.  
**Abibitec[805047]**  
 M. J. V. Pereira de Oliveira. Características de um sistema de visualização para o desenvolvimento de programas web. Master's thesis, University of Minho, Sep. 2006.  
**Abibitec[805048]**  
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*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805049]**  
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*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805050]**  
 P. R. Henriques, M. Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
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**Abibitec[805051]**  
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*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805052]**  
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**Abibitec[805053]**  
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*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805057]**  
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*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805058]**  
 P. R. Henriques, M. Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805059]**  
 P. R. Henriques, M. Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.  
**Abibitec[805060]**  
 P. R. Henriques, M. Berón, D. Cruz, N. Oliveira, and P. R. Henriques. Integrating dblp into the authoring workflow.  
*Proceedings of the 2011 IEEE International Conference on Program Comprehension*, 2011.





CS researchers use LaTeX as authoring tool for writing their papers. With BibTeX, there exists a valuable add-on for handling the bibliography of a paper. However, the data used for citing a paper differs very much resulting in a quite inconsistent style of citation.

Citation analysis is, however, a crucial issue when evaluating research, most prominently coined by the so-called "Journal Impact Factor". But if there is inconsistent or incomplete data, then the analysis becomes difficult and the result may not be appropriate.

To help authors and publishers in CS, we aim for a tool/service that interacts with dblp, the largest and most consistent literature data base in computer science to provide (at least) the following functionalities:

1. Given a "local" .bbl file generated with BibTeX, "synchronize" it with dblp and prepare a new, more consistent and complete .bbl file (or bibtex file).
2. Given the metadata of an article, identify the author profiles within dblp and provide further services based on this identification.

In this context, providing support for migrating LaTeX to ePub (or other suitable XML-formats) may also be a challenging service.

# 27: Display wall video streaming control interface

---

Organization: Telecommunications Lab

Contact: Jochen Miroll

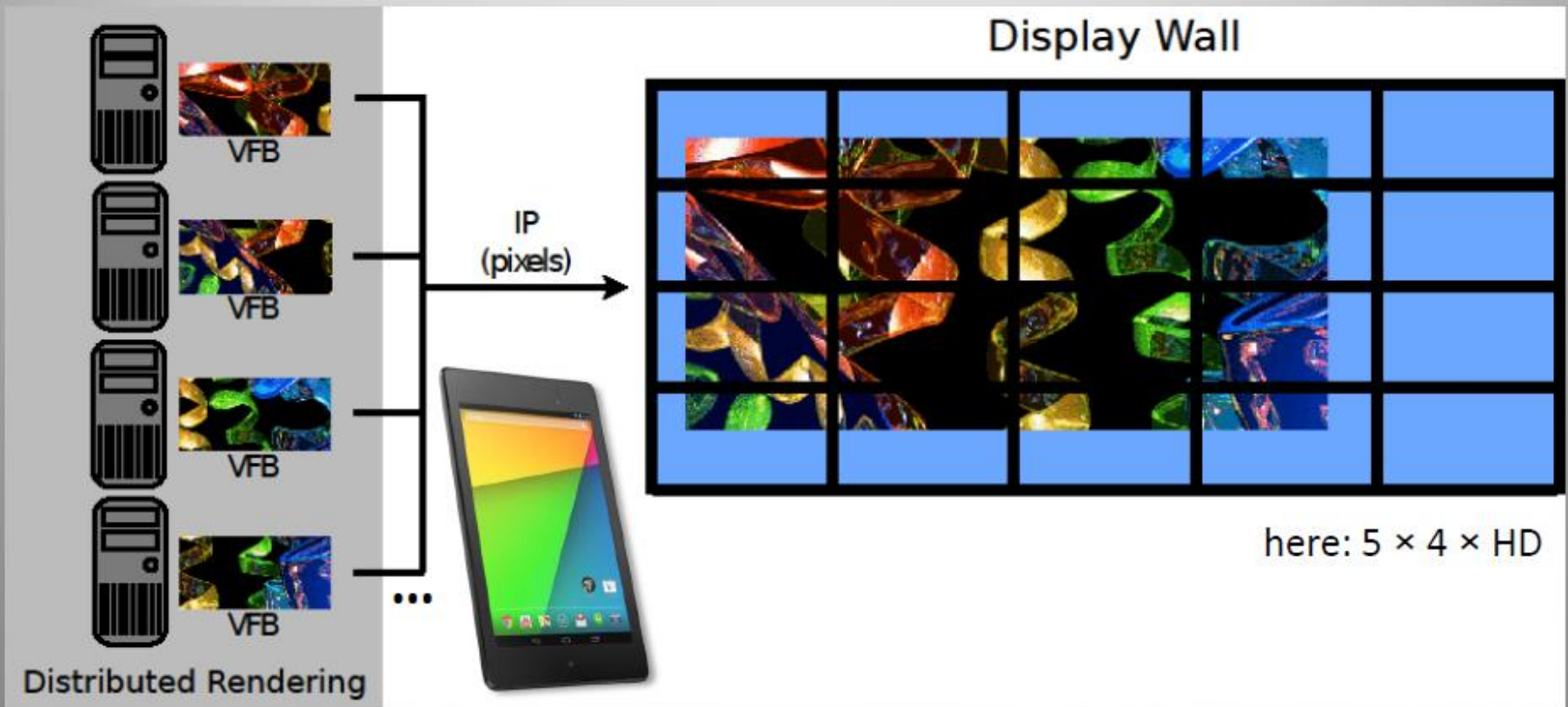
Technologies: FOSS

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(description on the next slide)

# Display walls for visualization at very high resolution

Software solution for **synchronous** generation and display of moving images at **improved scalability** and **increased resolution** using **independent** entities.



Tiled display walls can be used for a variety of purposes including scientific visualization at very high resolution and ultra-high definition television. A scalable prototype consisting of network interconnected, synchronized individual display nodes has been established at the telecommunications lab. It consists of four full-HD displays which jointly display stereoscopic video in 4K resolution.

In order to feed the display wall with live content, streams need to be routed and processed in a variety of ways. For this purpose, a Linux pipeline management daemon and some network I/O modules have been developed. Regarding the display side, the individual display nodes need to be configured as well as monitored in real-time.

Your task is to develop a web front-end for pipeline management and control, and live display of statistics gathered at the web server, e.g. through a mobile phone app.

# 28: Generation of virtual characters from personality traits

---

Organization: Sign Language Synthesis and Interaction group,  
DFKI-MMCI

Contact: Fabrizio Nunnari

Technologies: HTML/Ajax, whatever server-side web development environment, basic Python scripting.

---

(description on the next slide)

# Generation of virtual characters from personality traits

- Goal: a web platform where users can generate an avatar by providing a personality profile
  - No geometric input
  - Personality profile can be, e.g., the psychological OCEN model or the Dungeons & Dragon character ability points.
- Training phase: creation of a repository of avatars
  - Use Interactive Genetic algorithms
  - The system proposes avatars
  - The users “vote” or “score” them according to a personality model
- Retrieving phase: extraction of avatars
  - The user provides a personality profile
  - The system retrieves the best matching avatars



How much a personality trait might fit the shown character?  
Check one or more boxes per line.

	very	midly	slightly	neutral	slightly	midly	very	
Closed <i>Consistent</i> <i>Cautious</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Open <i>Inventive</i> <i>Curious</i>
Spontaneous <i>Easy-going</i> <i>Careless</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Conscientious <i>Efficient</i> <i>Organized</i>
Introvert <i>Solitary</i> <i>Reserved</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Extravert <i>Outgoing</i> <i>Energetic</i>
Disagreeable <i>Cold</i> <i>Unkind</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Agreeable <i>Friendly</i> <i>Compassionate</i>
Stable <i>Secure</i> <i>Confident</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Neurotic <i>Sensitive</i> <i>Nervous</i>

This research project aims at developing an architecture capable of generating believable virtual characters from their personality traits.

The underlying idea is to use of genetic algorithms to gather the knowledge of people believes in relating personality traits to people appearance.

The aim is to provide non technically skilled authors with tools to generate believable virtual characters, starting from their description, using non-geometrical input methods, such as questionnaire filling.

Unlike existing characters generation tools and/or production pipelines, this architecture would allow story writers, as well as casual users (like game players), to generate virtual characters that fulfil expectations in associating the character description to its appearance.



# 29: Crowdsourced Psycholinguistics Experiment Toolkit

---

Organization: Computational Linguistics

Contact: Asad Sayeed, Vera Demberg

Technologies: javascript/web design. if possible: databases,  
Mechanical Turk, python

---

(description on the next slide)

# Crowdsourced Psycholinguistics Experiment Toolbox

- **Customers:** Asad Sayeed and Vera Demberg
- **By psycholinguistics experiment we mean...?**
  - Simple example, complete the sentence:
    - “The robber violently \_\_\_\_\_”
  - Answer how fast, how likely, etc? ***BRAINS!!!***
- **How?** Recruit random people off Internet!
- **We need:**
  - UIs for diff. settings of same data (e.g. a game).
  - reusable data management/analysis workflow.
  - ***BRAINS!!!***



This project is about the construction of a set of tools to develop and manage psycholinguistic experiments via crowdsourcing, on platforms like Amazon Mechanical Turk. It involves a combination of user interface design, web development, and data representation and management work. The tools should be flexible, easy to deploy and distribute to other research groups, and be fun and engaging for the experimental subjects who will be interacting with it. Some of the experiments should be presented as online games.

Our research group studies how people's minds work when they process human language. One way to study human linguistic processing is to observe how people react to linguistic stimuli. Traditionally, psycholinguistic experimentation is performed under tightly controlled conditions with a relatively small numbers of known and "present" subjects. Recently, researchers in psycholinguistics have started to use crowdsourcing (i.e., finding workers on the web to do small intellectual tasks for small payments) in order to expand the subject pool and increase the flexibility of conducting experiments. The user interfaces and data collection for these experiments have until now been very ad hoc. We hope this project will improve consistency and repeatability in the field.

We will provide to the project team some basic background and some example experimental contexts for which to design systems. Issues like cheater detection, different experimental presentations for the same objective, user quality analysis, and user understanding of the task will come up in the project.

# 30: Encounter-based Networking for everyone

---

Organization: MPI-SWS

Contact: Paarijaat Aditya, Viktor Erdelyi

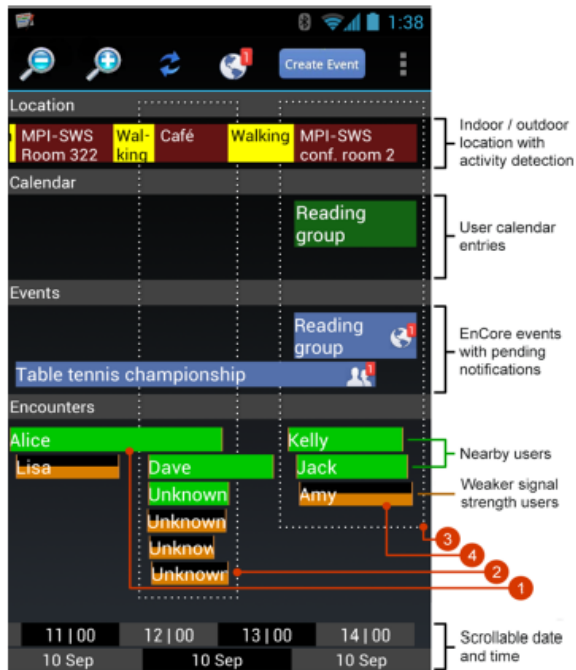
Technologies: Java, Web programming technologies

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(description on the next slide)

# Encounter Based Networking for everyone

Communicate with people you have met in the past, without exchanging any contact details, while controlling your anonymity. Uses Bluetooth to discover nearby devices.



Our existing prototype  
Android app

Redesign  
frontend  
from scratch  
using



PhoneGap

Cross platform app  
development  
frameworks  
(code in HTML, CSS,  
JavaScript, Python, Ruby)

Produce  
the app for  
multiple  
platforms



Generate native  
apps for Android  
and iOS. Web app  
for desktop

## **Research background:**

We are experimenting with the concept of Encounter Based Networking for mobile social applications. The high level idea is to enable a user to exchange content (pictures, video, audio, text, urls, etc) with other users that they have met in the past or are currently around them, without having to exchange any long term identifiable information about themselves.

For example, say you attended the semester opening party where you met new students with similar interests as yours. Even though you could not exchange contacts details with everyone, you may still like to follow up with them, for e.g., by sending them a message or by sharing pictures. We would like to provide an automated way for detecting nearby users and enabling them to contact each other individually or as a group. At the same time we would allow users to control to whom they reveal any long term identifiable information.

(continued on the next slide)

We have built a prototype Android application which uses your smartphone's bluetooth interface to discover nearby devices and exchange a unique one-time secret with each one of them. This secret acts as the address that identifies the 'encounter' between the two devices and is used to share content via communication and storage mediums such as Email, Facebook, Dropbox, etc. The prototype currently integrates with Facebook Events and Dropbox for sharing content. The application displays a user's location, encounters, calendar entries and the Facebook events they are participating along a timeline. Users can browse the timeline, create events with a set of encounters and share content via these events.

### **Project Requirements:**

The aim of the current project is to redesign the application using a framework that allows it to be easily ported to any mobile or desktop platform (e.g. Native apps for iOS and Android and Web interface for Windows and Mac). This will involve redesigning the application's frontend (the View) from scratch using a portable framework such as PhoneGap (<http://phonegap.com/>) or Corona (<http://www.coronalabs.com/>), which will interact with a database (the Model) that stores a user's activity history (location, encounters, events, etc.). The database can be accessed simultaneously via multiple of user's devices and can be dynamically updated by user's active device. We will provide a specification for the frontend UI and the functionality it should support. We will also provide the backend infrastructure and an initial specification of the API for interacting with the backend. We plan to actively co-develop the backend to meet any new application requirements that the students request.



# 31: Identity-Roulette: Video-chat for identity verification

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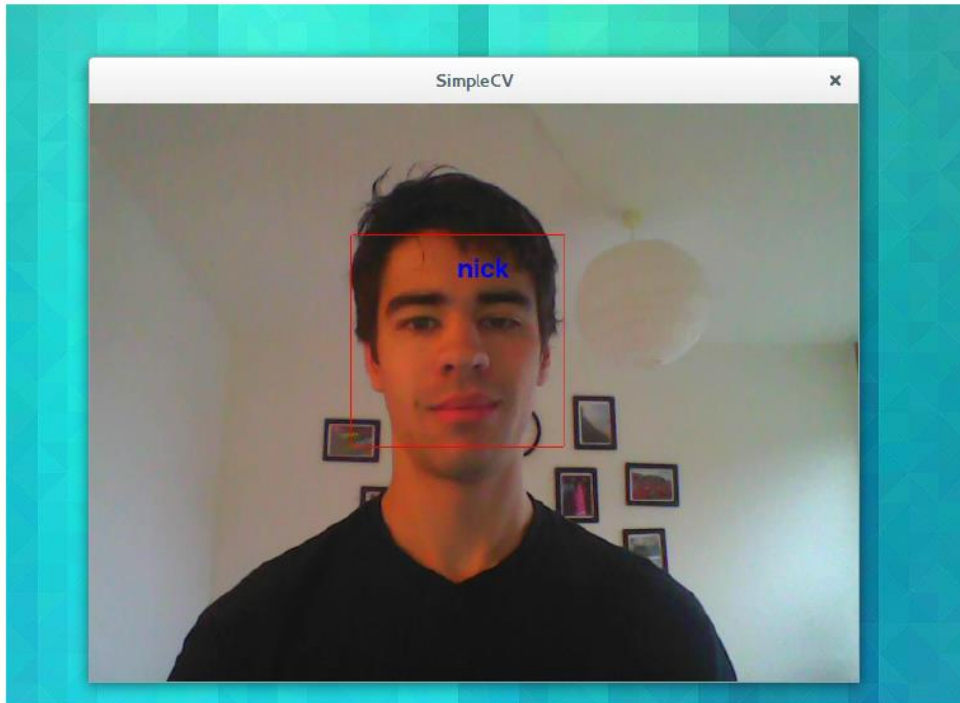
Organization: MPI-SWS

Contact: Nicholas Merritt

---

(description on the next slide)

# Identity-Roulette



Max  
Planck  
Institute  
**for**  
**Software Systems**

- Videochat server/client
- Plug-in architecture
- Export 'verified' identity information

## **Research Background:**

Accountability and anonymity are often desired properties for online services. Allowing users to use pseudonyms as opposed to their true identity, however, often leads to abuse such as spam, inappropriate comments or ballot-stuffing. Requiring a user to provide use his real identity, however, destroys anonymity. An "accountable-pseudonym" is virtual persona with the property that each individual may obtain at most one pseudonym per service.

Consider a user editing a page on Wikipedia. Depending on the topic, the editor may or may not wish to be known by his real name. However, if a user is vandalizing a page, the community would like to ban the individual from editing pages. If the individual is simply able to create a new user account, then he will simply continue vandalizing the page. Our group (Distributed Systems under Peter Druschel) is currently working on a flexible infrastructure for creating sybil-attack resistant online identities while preserving anonymity. Traditional measures, such as requiring a credit-card or government issued identification, help in preventing sybil-attacks but typically require an inconvenient enrollment procedure and do not provide anonymity. Using an accountable-pseudonym would achieve both goals.

(continued on the next slide)

Our approach is to allow users to provide various forms of evidence which they can collect conveniently and are comfortable sharing in a blinded fashion. They use this to obtain a master-identity which can be used to create unlinkable accountable-pseudonyms for various online services. One particular method for generating evidence used to generate the accountable-pseudonyms is by a so-called 'pseudonym party'[1]. This requires participants to meet at a specific time and location and exploits the fact that an individual cannot be at more than one physical place at a time. We wish to extend this to the online setting. As it is possible to appear online at multiple locations at once, we use biometrics to prevent users from registering multiple times. The goal of your will be to implement the infrastructure to allow such a 'pseudonym party' to take place, but NOT the biometrics.

(continued on the next slide)

## **Project Requirements:**

We would like server and client software which allows both one-to-one and group video chat with support for displaying additional content, such as a static photo, along-side the videos. Clients should connect to the server using a secure channel. The server should support a plug-in architecture to allow intercepting video streams for processing, such as face-recognition.

The main challenge will not be writing video streaming components, as libraries already exist for this, but rather integrating existing software in an easy-to-use and extendable manner.

[1] Ford, Bryan, and Jacob Strauss. "An offline foundation for online accountable pseudonyms." Proceedings of the 1st workshop on Social network systems. ACM, 2008.

# 32: Mensa Friends Locator

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Organization: Saarland University

Contact: Sven Bugiel

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(description on the next slide)



# Mensa Friend Locator

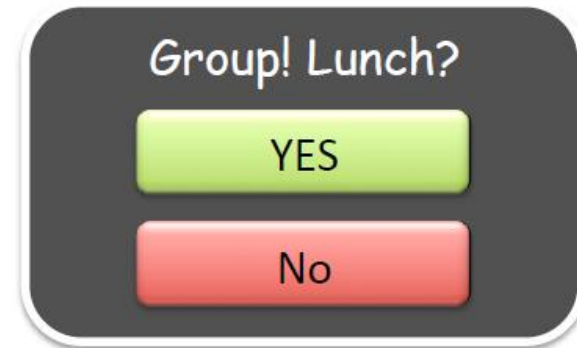


## Core functionality

- Smartphone app (pref. Android)
- Map-based GUI to locate friends in main mensa/mensa café
- Mutual authentication before tracking possible
- Option to enable/disable tracking

## Optional stuff

- iOS version or HTML5 app
- Group invitation to go for lunch
- Automatically activate/deactivate location broadcast (e.g., time of day)
- Indoor navigation (e.g., Wi-Fi)
- Integration with Happa app or UdS app
- Server-based vs p2p architecture





We require a service that allows people to locate their friends (or colleagues) in an indoor environment. Specifically, we think about a mensa (student restaurant) environment, where it is not always that easy to find your group of friends/colleagues, especially during the lecture period.

The service should consist of at least an app for current smartphone OSes, preferably Android (or maybe even based on HTML5 for a platform independent implementation). The front-end that shows the location of friends should be based on graphical representation preferably based on a custom map of the environment, e.g., using the Google maps API. Special consideration should be given to environments with several floors (e.g., main mensa vs mensa cafe).

There are no strict requirements of how location data is obtained and synchronized between users (e.g., indoor navigation techniques using Wi-Fi if the environment allows; or manual setting of the current location by the end-users and synchronization via a web-service). However, there are privacy requirements: 1) Users must be able to activate/deactivate their tracking, potentially even defining criteria for automatically starting/stopping tracking (e.g., time of data, location, visible Wi-Fi hotspots); 2) user must have previously authenticated each other before being able to see each other (e.g., based on challenge-response or pairing protocols run over the Internet or even of an NFC link).

Since there exists already "mensa-related" apps like the UdS App (see last SW Engineering course) or the "Happa" app by DFKI, an integration into one of these apps might be deemed useful.

# 33: Smart Authentication

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Organization: CISPA

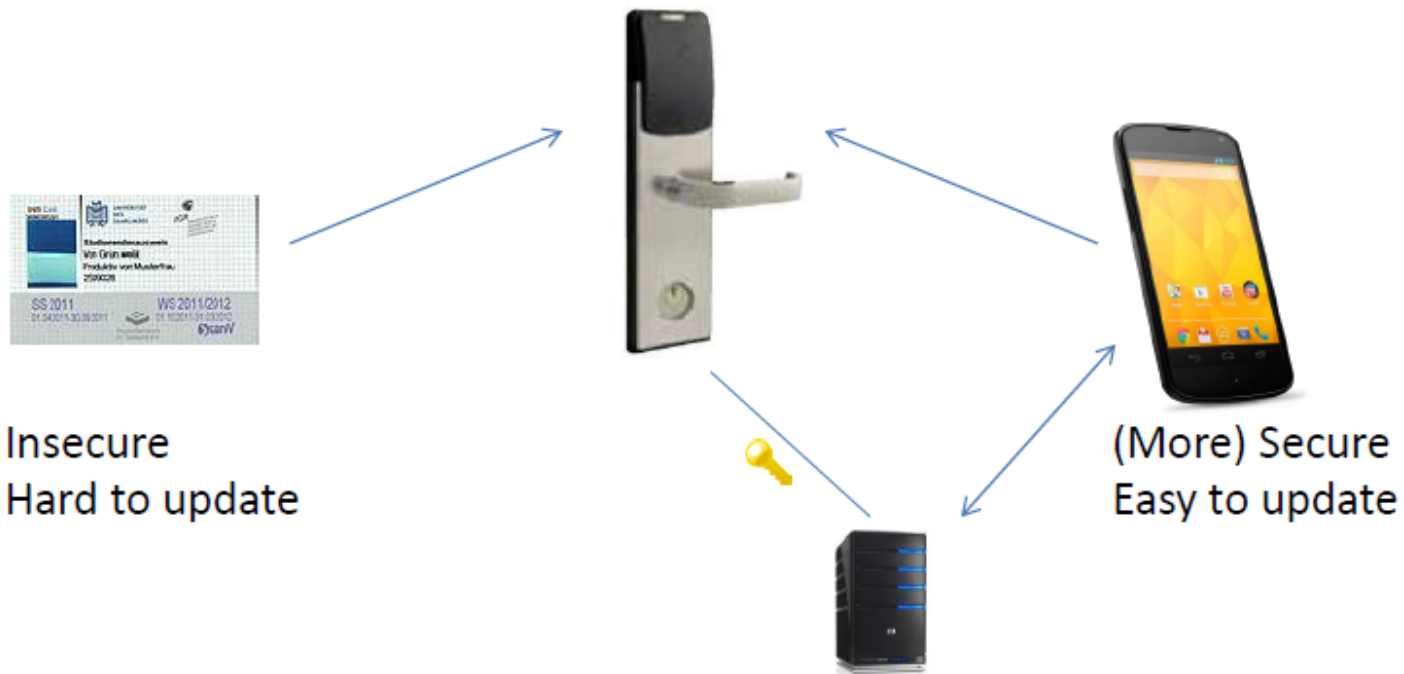
Contact: Fabian Bendun

Technologies: Java, Android

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(description on the next slide)

# Smart Authentication



## Goal of the project:

- Design and implementation of the door-server-smartphone architecture
  - Generic in the communication channel, authentication protocol, and policy
- Prototypical instantiations of channel, protocol and policy

## Further information:

- Smartphones for the implementation can be provided
- Programming language to be used is Java
- Operations system to be used Android

Authentication to enter rooms is traditionally done using keys and nowadays often using SmartCards. These SmartCards usually become insecure over time, e.g., the MifareClassic Cards. However, replacing these systems by their newer versions is highly expensive. Therefore it is interesting to use other ways to physically authenticate. One possible way is using Smartphones. The Smartphone allows the installation of updates and their OS protects data stored by an app.

The goal of the project is to design and implement a system consisting of three parties: first, the client application that requires authentication. This client could be the door that should be opened. Second, a smartphone application that asks the client for authentication and needs to do a computation for the client to authenticate. Third, a server that has a secret -- shared with the door -- and helps the smartphone doing the computation if the smartphone can authenticate towards the server.

The advantage of this seemingly complicated construction is that the client does not need any network access or a lot of computational power. Therefore the client could be easily put into a door. Second, the authentication is done between smartphone and a server which can be both updated with low costs.

The design of the system should be flexible regarding the communication channels and the authentication protocol used. For example client and smartphone could use Bluetooth, NFC or even the camera in order to communicate.

# 34: Web-based board game development platform

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Organization: N/A (private)

Contact: Esfandiar Mohammadi

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(description on the next slide)

# 34: (Web-based) Board game development platform

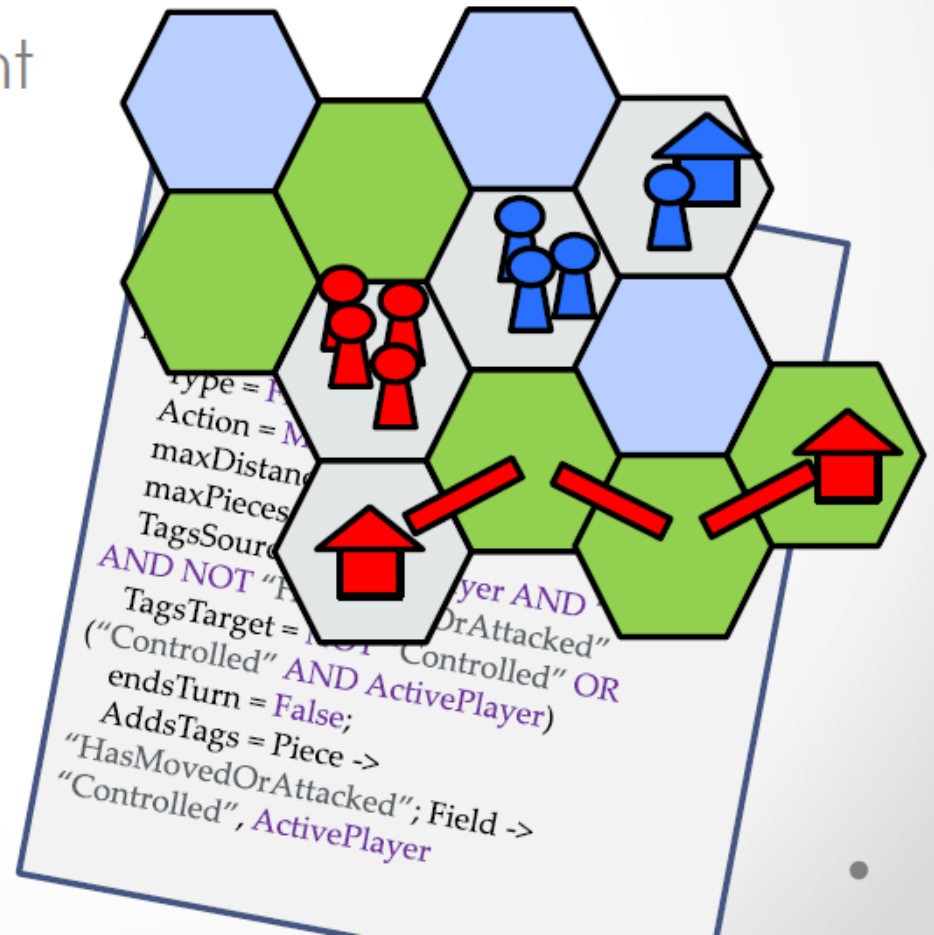
- Developer Management
- Script-/Rules Editor

```
Unit.OnClick:
  ShowOptions("Move", "Attack")

Move:
  Type = FieldAction;
  Action = MovePieces;
  maxDistance = 3;
  maxPieces = 1;
  TagsSource = ActivePlayer AND "Unit"
  AND NOT "HasMovedOrAttacked"
  TagsTarget = NOT "Controlled" OR
  ("Controlled" AND ActivePlayer)
  endsTurn = False;
  AddsTags = Piece ->
  "HasMovedOrAttacked"; Field ->
  "Controlled", ActivePlayer
```

# 34: (Web-based) Board game development platform

- Developer Management
- Script-/Rules Editor
- Map Editor
- (Online) Playtests





A generic (web-based) system for specifying and playing board games shall be developed. The system shall come with a map-editor (for hexagonal maps), with a rule editor and an appropriate language for specifying rules and with an interface to play the game in a multiplayer fashion. Such a system should allow the development of new board games and make it simple to (test-) play them online.

## Features

- User management / game project management
- Map Editor (that additionally allows for saving and loading maps)
- Comprehensive rule language (that suffices for expressing, e.g., the Settlers of Catan game)
- Online rule Editor (preferably with syntax highlighting)
- Multiplayer-Gaming interface

## 35: Transferring Amazon's "Customers Who Bought This Item Also Bought ..." to the offline retail environment

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Organization: DFKI

Contact: Frederic Kerber

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(description on the next slide)

# Transferring Amazon's "Customers Who Bought This Item Also Bought ..." to the offline retail environment

In this project, we want you to create a system that enhances the (future) shopping experience with social media techniques. As a starting point, we want to use Amazon's collaborative filtering recommender approach ("Customers Who Bought This Item Also Bought ...") in an "offline" retail environment.

It should allow customers in waiting/idle-times to rate products they bought earlier directly in the market. In a second step, users should also be able to learn about the ratings of other customers directly in the supermarket. As an extension, it could also be of interest to track the customers' attention, in relation to this feature.

With the Innovative Retail Laboratory, our living lab, we have the option to work with information and technology that is not yet available in supermarkets (but most likely, will come in the future) and you might also use this for your project.

Nice-to-have (i.e. this is not a necessary precondition to take this project!):

- Background in marketing/psychology/social media technologies/recommender systems

Contact:

Frederic Kerber ([frederic.kerber@dfki.de](mailto:frederic.kerber@dfki.de))

Pascal Lessel ([pascal.lessel@dfki.de](mailto:pascal.lessel@dfki.de))



In this project, we want you to create a system that enhances the (future) shopping experience with social media techniques. As a starting point, we want to use Amazon's collaborative filtering recommender approach ("Customers Who Bought This Item Also Bought ...") in an "offline" retail environment. It should allow customers in waiting/idle-times to rate products they bought earlier directly in the market. In a basic version, this could simply be done with a 5-star rating; but more elaborate ways of doing it would also be interesting. In a second step, users should also be able to learn about the ratings of other customers: On the one hand in an online-fashion (e.g. if the system receives the information that you will buy some kind of coffee in the supermarket X, you can see what would be the best product according to the other customers), on the other hand in an offline-fashion directly in the supermarket. One option could be to show the information on digital price boards, another one to present the information in a reasonable manner on the shopping cart or public displays. As an extension, it could also be of interest to track the customers' attention.

With the Innovative Retail Laboratory, our living lab, we have the option to work with information and technology that is not yet available in supermarkets (but most likely, will come in the future) and you might also use it for your project.

Nice-to-have (i.e. this is not a necessary precondition to take this project!):  
\*) Background in marketing/psychology/social media technologies/recommender systems.

# 36: “Advertisements” in a Smart Home Environment

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Organization: DFKI

Contact: Pascal Lessel

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(description on the next slide)

# “Advertisements” in a Smart Home Environment

The goal is to create a testbed for context-sensitive “advertisements” for future smart home environments.

We want to present home-specific “advertisements” during movies instead of general ones, to persuade the user to carry out specific activities, for example to drink water, because we recognized that he hasn’t done so for a long time.

Your task is to create a modular platform supporting this goal. The platform should enable to test different settings (e.g. using multimodal “advertisements”).

Nice-to-have (i.e. these are not necessary preconditions to take this project!):

- Background in conducting user studies
- Background in marketing/psychology/persuasive computing

Contact:

Pascal Lessel ([pascal.lessel@dfki.de](mailto:pascal.lessel@dfki.de))

Frederic Kerber ([frederic.kerber@dfki.de](mailto:frederic.kerber@dfki.de))



In this project the goal is to create a testbed for context-sensitive “advertisements” for future smart home environments. In these environments it will be (and already is to a certain extent) possible to computationally know in which state the household appliances are (e.g. “your dishwasher has just finished”), which products are in your fridge, which of these products will be go off soon and much more.

On the other hand, there are time spans at home in which you are neither productive (e.g. waiting for the food to be finished on the hotplate) nor entertained (e.g. advertisements during a movie). We want to use these idle-times and want to present home-specific “advertisements” during movies to persuade the user to carry out specific activities (e.g. drinking water, because we recognized that he hasn’t done so for a long time, opening the dishwasher, etc.) Your task is to create a modular platform that enables us to test different settings (e.g. using multimodal “advertisements”). We want to have the option to use own movie files as well as youtube, in which we want to overlay the youtube’s advertisement movies with our own content. Around this core feature, you will work on a proper administration option, an intelligent way to select the best “advertisements” in a specific situation and a logging feature. Depending on your ideas, skills and background we may enhance the testbed accordingly.

Nice-to-have (i.e. these are not necessary preconditions to take this project!):

\*) Background in conducting user studies.

\*) Background in marketing/psychology/persuasive computing.

# 37: Database Watchdog

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Organization: Saarstahl AG

Contact: Michael Brill

Technologies: Java, JavaEE, JBoss, JSF (Primefaces)

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In order to supervise critical databases and tables that can be changed directly by an authorized person (via DBMS or even Access), Saarstahl is in need of a tool to automatically detect changes in a previously configured database/table. The tool must be able to record changes for future reference and inform about them via email.



# 38: Android app: SB to Berlin travel assistance

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Organization: DFKI

Contact: Matthias Klusch

Technologies: Android

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Mobile Android app for Saarbrücken to Berlin travel assistance - sort of "the pleasant way of travelling to our capital and back".

Basic software for the app will be provided by the customer. More information on this project will be available after 24 October, as the customer is currently on vacation.

# 39: Android app: campus orientation for newcomers

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Organization: DFKI

Contact: Matthias Klusch

Technologies: Android

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Android P2P app for Help on Campus - sort of "UdS campus orientation app for Newcomers".

Basic software for the app will be provided by the customer. More information on this project will be available after 24 October, as the customer is currently on vacation.

# 40: ModelMate

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Organization: Testfabrik AG

Contact: Bernd Pohl

Technologies: Neo4JGraph (Datenbank),  
Play (Webframework)

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After a complex exploration of a web application, we generate a graph (model) of the application containing states and interactions (Neo4JGraph Database). We want to get a signature on the graph and we would like to search the graph (full text, URL, XPath). The solution should be done as a web application using Play as framework in order to interact with our existing frontend.

# 41: Blender's next UI

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Organization: DFKI / MMCI

Contact: Alexis Heloir

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(description on the next slide)

Clickable links from the description:

<http://www.blenderguru.com/new-blender-ui-proposal/comment-page-3/>

<http://pyppet.blogspot.de/2012/01/pyppet-webgl-streaming.html>

# Prototyping Blender's Next UI

The Blender is a free and open-source 3D computer graphics that has been developed by an large and enthusiastic community since 2002. Blender offers a wide selection of features spanning from modeling to fluid simulation and special effect composing in a seamless and -- somehow -- consistent user interface.

Though the Blender user interface is unique and most of the time well thought, Blender has had a reputation of being difficult to learn for users accustomed to other 3D graphics software. To address this issue, an in-depth study on the Blender user interface was conducted recently. As a result, many of Blender's UI shortcomings have been pinpointed along with improvement suggestions.

<http://www.blenderguru.com/new-blender-ui-proposal/comment-page-3/>.

We invite you to develop an interactive implementation of a subpart of the Blender UI proposal. Implementation could be done either by modifying blender's internal (C, C++, Python) or by crafting the interface from scratch in AJAX around a streamed WebGL viewport in a browser supporting websockets and WebGL

<http://pyppet.blogspot.de/2012/01/pyppet-webgl-streaming.html>.

Happy Blending!



# 42: Sign Authoring platform

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Organization: DFKI / MMCI

Contact: Fabrizio Nunnari, Alexis Heloir

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In this project, your goal will be to develop the prototype of a web-platform enabling people to author sign language animations using 3D avatars. The platform should support direct 3D input with the Leap Motion or the Kinect.

# A web platform for Sign authoring using Natural User Interfaces

- Goal: a web platform where deaf users can edit, review, comment, and improve new sign to populate a world dictionary of signs
  - Based on avatar animation (no video)
  - Uses NUIs (no mouse and keyboard)
- Use Leap Motion or Kinect to
  - Record motion
  - Adjust character's posture



# 43: CityAnalyzer

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Organization: DFKI

Contact: M. Mehdi Moniri

Technologies: C++, Java

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CityAnalyzer brings different component of a future car together. Precise Vehicle Positioning, Eye Tracking, Head Tracking, City Modeling and an Analysis Tool. The students will have the chance to integrate these different modules in one software to build a 3D analysis tool for vehicles.

In order to maintain a robust software we will start with simulating the different named hardware (GPS positioning, Eye Tracking, Head Tracking) so that the students can focus on the software design and a robust implementation. At the final stage of the project, if there is some time left, we will integrate the real hardware in the CityAnalyzer.





3D Environment Model



3D Head Tracking



3D Eye Tracking



Vehicle Positioning

With City Analyzer one can answer questions like:

- The driver is looking at which building?
- Which part of the Campus/City attracts the attention of the drivers most?



Mercedes Benz's DICE Augmented Reality System

You will get the chance to work with a combination of environment modeling, software, and hardware.

What we expect: **robust** system!

# 44: Clinical Diagnostics App – The Phenomizer

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Organization: MMCI Excellence Cluster

Contact: Marcel Schulz

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(description on the next slide)

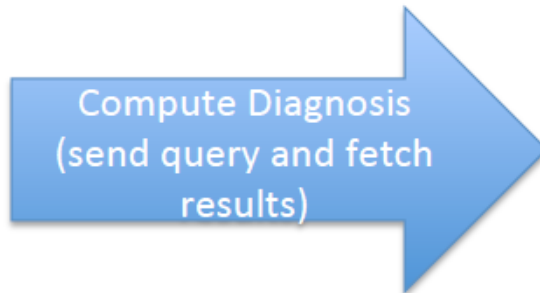
# Clinical Diagnostics App – The Phenomizer

Design and implement a mobile device app for computational clinical diagnostics similar to our previously developed webserver

The Phenomizer (<http://compbio.charite.de/phenomizer/>)

## Overview:

Input Observed Phenotypes into mobile device



-Visualize List of Ranked Diseases  
-Link to databases

## Webserver<sup>1</sup> Example:

The Phenomizer

Patient's Features.

HPO.	Feature	Modifier
category: Abnormality of the genitourinary system (2 Items)		
HP:000144	Decreased fertility	observed.
HP:0100580	Urogenital fistula	observed.
category: Abnormality of the nervous system (1 Item)		
HP:0001249	Intellectual disability	observed.
category: Abnormality of the skeletal system (1 Item)		
HP:0001160	Broad palm	observed.
category: Growth abnormality (1 Item)		
HP:0004322	Short stature	observed.

Clear. Mode of inheritance:  Get diagnosis.



<input type="checkbox"/>	p-value	Disease Id.	Disease name.	Genes.
<input type="checkbox"/>	1.0000	OMIM:19...	DOWN SYNDROMETRISOMY 21, INCLUDED	GATA1
<input type="checkbox"/>	1.0000	OMIM:60...	#601803 PALLISTER-KILLIAN SYNDROME; P...	
<input type="checkbox"/>	1.0000	OMIM:26...	RETINITIS PIGMENTOSA, DEAFNESS, MENT...	
<input type="checkbox"/>	1.0000	OMIM:10...	#101800 ACRODYSOSTOSIS 1, WITH OR WI...	PRKAR1A
<input type="checkbox"/>	1.0000	OMIM:23...	#234050 TRICHTHODYSTROPHY, NONPH...	MPLKIP
<input type="checkbox"/>	1.0000	OMIM:30...	#309000 LOWE OCULOCEREBRORENAL SY...	OCRL

This project is about designing and implementing an App for a mobile device that fulfills the role of a “mobile doctor”, doing computational clinical diagnosis. In computational clinical diagnosis one is given an input list of phenotypes and database of known diseases that are associated with phenotypes. The task is then to rank diseases upon their likelihood to have caused the observed phenotypes.

We have previously developed The Phenomizer webserver that does computational clinical diagnosis and is used by thousands of users in over 80 countries. In our approach the phenotypes are related through an ontology and diseases are annotated with terms in the ontology. Using similarity queries for ontology terms we developed statistical methods to rank annotated diseases.

Here we would like to port the interface of the Phenomizer to an App that can be run on a mobile device, phone or pad, and allow more users to use it. The mobile app would supply search functionality for selecting phenotypes. Then it communicates with our server and the results are fetched onto the device. Last the results are displayed and saved or send by email.

# 45: Interactively Exploring Huge Graphs

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Organization: Exploratory Data Analysis group at MMCI

Contact: Jilles Vreeken

Technologies: C++, possibly Hadoop

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(description on the next slide)



# Interactively Exploring *Huge* Graphs



Big Data, Big Data everywhere!

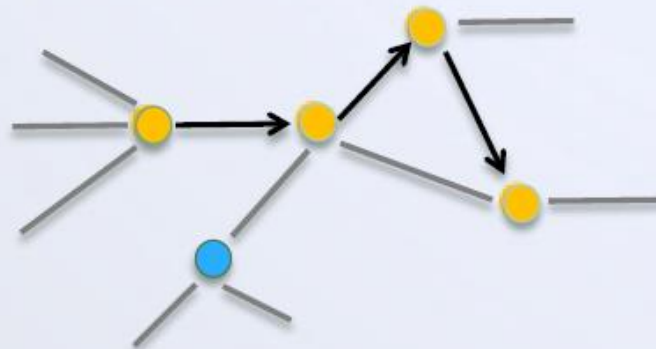


we can now store, but  
we lack tools to explore!  
...and are creating Big Data **tombs**...



**Goal:** an **efficient** tool for interactively exploring **giganormous** graphs, dynamically computing and showing only the **locally** most **interesting** parts

**req:**  
C++,  
multi-platform,  
hadoop?



contact:  
dr. Jilles Vreeken

Thanks to modern hardware and database technology we can now store truly huge amounts of data. Many of the most interesting data are naturally stored as graphs. Examples include social networks, the web, biological networks, etc. However, while we can now store huge graphs, we strongly lack in tools to explore them; we run the risk of creating data 'tombs'.

The goal of this project is hence to develop a tool by which we can interactively explore very large graphs (millions of nodes, billions of edges). The key element will be decide what to show; plotting a full graph typically results in a useless 'hairball'. Instead, our system will only show part of the local neighborhood, depending on how 'strange' or 'normal' neighbors and neighborhoods are.

This is a typical Big Data project, in that it combines both challenges on the efficiency side (keeping things snappy despite huge data and complex computation) as well as on the research side (what to show), and in that it has a huge potential impact.

The ultimate goal is to have a tool that Facebook and Google will be envious of. And one that we can use in further research :-)

# 46: Social Review Facebook App

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Organization: MPI-SWS

Contact: Cristian Danescu-Niculescu-Mizil

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(description on the next slide)



# Social Review Facebook App

Max Planck Institute SWS

Build the best mix since peanut-butter and chocolate:

The functionality of  
traditional review sites



+

Social context offered  
by Facebook



Big advantages over traditional review sites:

- 1) **personalized ratings**, tuned to the social context of the user
- 2) an additional level of **trust**, linking to FB profiles
- 3) offer **personalized recommendations**:
  - "what restaurants people similar to me like?",
  - "what restaurants did my friends enjoy lately?", etc.

Build a review system that integrates the functionality of traditional review sites (e.g., Yelp.com, TripAdvisor.com) with the social context offered by Facebook. Such a system would have several advantages over traditional review sites:

- it provides personalized ratings that take into account the social circle of the user
- it provides an additional level of trust, linking reviews to Facebook profiles
- it would allow personalized recommendations (e.g., "What restaurants people from your demographics like?", "What restaurants your friends enjoyed lately?")

The system would consist of two parts: a Facebook application and a public webpage that would share the same review database.